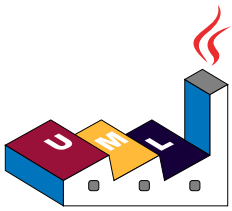
UML-Diagramme mit PlantUML



PlantUML Sprachreferenz

(Version 1.2023.11)

PlantUML ist ein quelloffenes Projekt, welches das Erstellen von UML-Digrammen ermöglicht. Es werden die folgenden Typen von UML-Diagrammen unterstützt:

- Sequenzdiagramm
- Anwendungsfalldiagramm
- Klassendiagramm
- Objektdiagramm
- Aktivitätsdiagramm
- Komponentendiagramm
- Verteilungsdiagramm
- Zustandsdiagramm
- Zeitverlaufsdiagramm

Außer UML werden die folgenden Diagrammtypen unterstützt.

- JSON Data
- YAML Data
- Network diagram (nwdiag)
- Wireframe graphical interface
- Archimate diagram
- Specification and Description Language (SDL)
- Ditaa-Diagramm
- Gantt-Diagramm
- MindMap diagram
- Work Breakdown Structure diagram
- Mathematik in AsciiMath- oder JLaTeXMath-Notation
- Entity Relationship diagram

Diagramme werden in einfacher und intuitiver Sprache durch textuelle Notation beschrieben.

1 Sequenzdiagramm

Die Erstellung von Sequenzdiagrammen mit PlantUML ist bemerkenswert einfach. Diese Benutzerfreundlichkeit ist größtenteils auf die benutzerfreundliche Syntax zurückzuführen, die sowohl intuitiv als auch leicht zu merken ist.

- **Intuitive Syntax:**

In erster Linie schätzen die Benutzer die einfache und intuitive Syntax, die PlantUML verwendet. Dieses gut durchdachte Design bedeutet, dass selbst diejenigen, die neu in der Diagrammerstellung sind, die Grundlagen schnell und ohne Schwierigkeiten erfassen können.

- **Text-Grafik-Korrelation:**

Ein weiteres Unterscheidungsmerkmal ist die große Ähnlichkeit zwischen der textlichen Darstellung und der grafischen Ausgabe. Diese harmonische Korrelation stellt sicher, dass die textlichen Entwürfe ziemlich genau in grafische Diagramme übersetzt werden, was ein kohärentes und vorhersehbares Design-Erlebnis ohne unangenehme Überraschungen in der Endausgabe ermöglicht.

- **Effizienter Entwurfsprozess:**

Die starke Korrelation zwischen dem Text und dem grafischen Ergebnis vereinfacht nicht nur den Erstellungsprozess, sondern beschleunigt ihn auch erheblich. Die Nutzer profitieren von einem schlankeren Prozess, der weniger zeitaufwändige Überarbeitungen und Anpassungen erfordert.

- **Visualisierung während des Entwurfs:**

Die Möglichkeit, sich das endgültige grafische Ergebnis schon während der Erstellung des Textes vorzustellen, ist eine Funktion, die viele als unschätzbar empfinden. Sie fördert einen reibungslosen Übergang vom ersten Entwurf zur endgültigen Präsentation, steigert die Produktivität und verringert die Fehlerwahrscheinlichkeit.

- **Einfache Bearbeitungen und Überarbeitungen:**

Vor allem die Bearbeitung bestehender Diagramme ist ein problemloser Prozess. Da die Diagramme aus Text generiert werden, ist es für die Benutzer wesentlich einfacher und präziser, Anpassungen vorzunehmen als bei der Bearbeitung eines Bildes mit grafischen Werkzeugen. Es läuft darauf hinaus, einfach den Text zu ändern, ein Prozess, der viel einfacher und weniger fehleranfällig ist als Änderungen über eine grafische Oberfläche mit der Maus.

PlantUML ermöglicht einen einfachen und benutzerfreundlichen Ansatz zur Erstellung und Bearbeitung von Sequenzdiagrammen und erfüllt die Bedürfnisse von Anfängern und erfahrenen Designern gleichermaßen. Es nutzt geschickt die Einfachheit von Texteingaben, um visuell anschauliche und genaue Diagramme zu erstellen, und etabliert sich damit als unverzichtbares Werkzeug für die Diagrammerstellung.

Sie können mehr über einige der gängigen Befehle in PlantUML erfahren, um Ihre Diagrammerstellung zu verbessern.

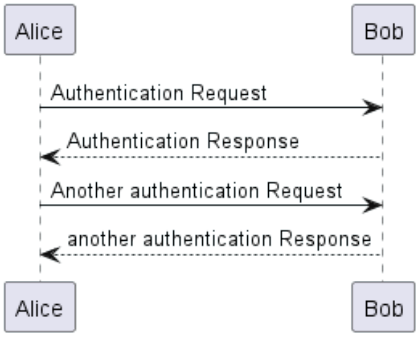
1.1 Grundlagen

Die Zeichenfolge `->` wird verwendet, um eine Nachricht zwischen zwei Teilnehmern zu zeichnen. Teilnehmer müssen nicht explizit deklariert werden.

Um eine gepunktete Linie zu zeichnen, verwende `-->`.

Es ist auch möglich `<-` und `<--` zu verwenden. Dieses ändert nicht die Zeichnung, kann aber die Lesbarkeit erhöhen. Beachte: Das gilt nur für Sequenzdiagramme. In anderen Diagrammen können andere Regeln gelten.

```
@startuml
Alice -> Bob: Authentication Request
Bob --> Alice: Authentication Response

Alice -> Bob: Another authentication Request
Alice <-- Bob: another authentication Response
@enduml
```



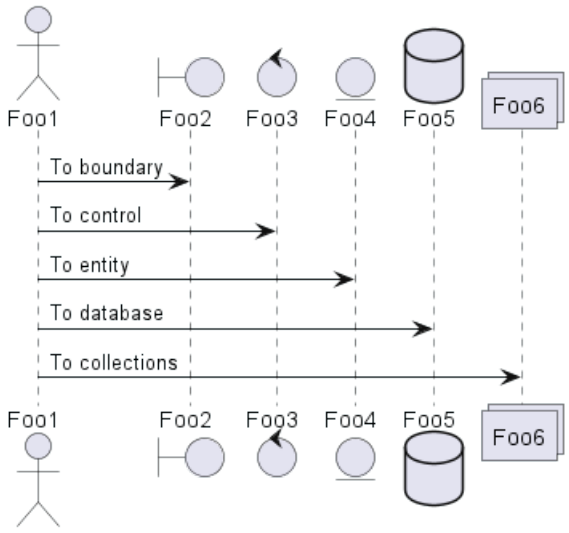
1.2 Deklaration eines Teilnehmers

Mit dem Schlüsselwort `participant` lässt sich die Reihenfolge von Teilnehmern ändern.

Sie können auch folgende andere Schlüsselwörter anstelle von `participant` verwenden:

- `actor`
- `boundary`
- `control`
- `entity`
- `database`
- `collections`

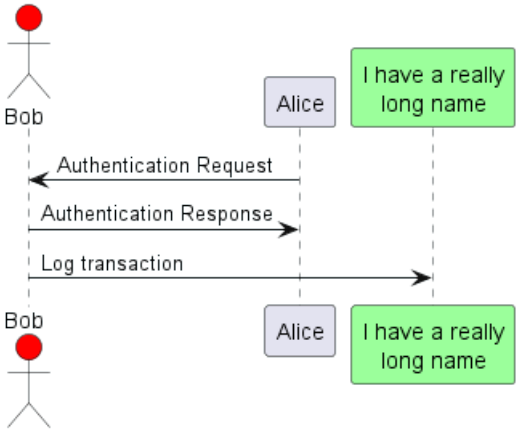
```
@startuml
actor Foo1
boundary Foo2
control Foo3
entity Foo4
database Foo5
collections Foo6
Foo1 -> Foo2 : To boundary
Foo1 -> Foo3 : To control
Foo1 -> Foo4 : To entity
Foo1 -> Foo5 : To database
Foo1 -> Foo6 : To collections

@enduml
```



Teilnehmer können mittels `as` umbenannt werden.

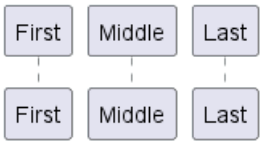
Die Hintergrundfarbe von Teilnehmern oder Akteuren kann mithilfe von HTML Farbcodes oder Farbbezeichnungen gesetzt werden.

```
@startuml
actor Bob #red
' The only difference between actor
'and participant is the drawing
participant Alice
participant "I have a really\nlong name" as L #99FF99
/' You can also declare:
   participant L as "I have a really\nlong name"  #99FF99
  '/

Alice->Bob: Authentication Request
Bob->Alice: Authentication Response
Bob->L: Log transaction
@enduml
```



Mit dem Schlüsselwort `order` kann die Reihenfolge der Teilnehmer angepasst werden.

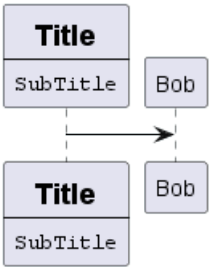
```
@startuml
participant Last order 30
participant Middle order 20
participant First order 10
@enduml
```



1.3 Deklaration eines Teilnehmers mit mehreren Zeilen

Der Bezeichner eines Teilnehmers kann mehrere Zeilen enthalten, zum Beispiel mit Titel und UnterTitel.

```
@startuml
participant Participant [
    =Title
    ----
    ""SubTitle""
]

participant Bob

Participant -> Bob
@enduml
```

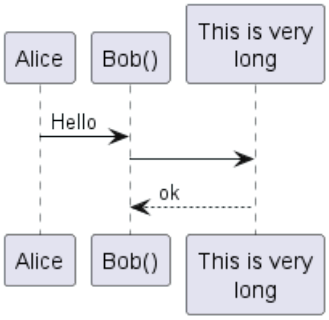


[Ref. QA-15232]

1.4 Verwendung von nicht-alphanumerischen Zeichen

Soll die Bezeichnung eines Teilnehmers nicht-alphanumerische Zeichen enthalten (z.B. Klammern oder Zeilenumbrüche), müssen Anführungszeichen bei der Definition verwendet werden. Das Schlüsselwort `as` kann verwendet werden, um einen Alias für einen Teilnehmer zu definieren.

```
@startuml
Alice -> "Bob()" : Hello
"Bob()" -> "This is very\nlong" as Long
' You can also declare:
' "Bob()" -> Long as "This is very\nlong"
Long --> "Bob()" : ok
@enduml
```

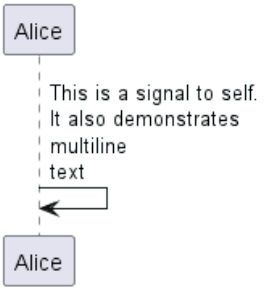


1.5 Nachrichten an sich selbst

Ein Teilnehmer kann auch eine Nachricht an sich selbst schicken.

Die Nachricht kann mehrere Zeilen umfassen. Mit können Zeilenumbrüche eingefügt werden.

```
@startuml
Alice->Alice: This is a signal to self.\nIt also demonstrates\nmultiline \ntext
@enduml
```



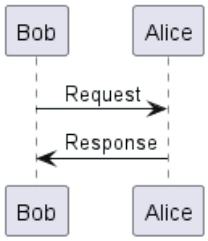
[Ref. [QA-1361](https://forum.plantuml.net/1361)]

1.6 Text alignment

Text alignment on arrows can be set to `left`, `right` or `center` using `skinparam sequenceMessageAlign`.

You can also use `direction` or `reverseDirection` to align text depending on arrow direction. Further details and examples of this are available on the skinparam page.

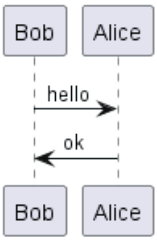
```
@startuml
skinparam sequenceMessageAlign right
Bob -> Alice : Request
Alice -> Bob : Response
@enduml
```



1.6.1 Text of response message below the arrow

You can put the text of the response message below the arrow, with the `skinparam responseMessageBelowArrow true` command.

```
@startuml
skinparam responseMessageBelowArrow true
Bob -> Alice : hello
Alice -> Bob : ok
@enduml
```



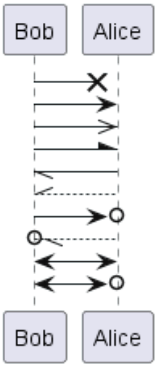
1.7 Ändern der Pfeilart

Die Art eines Pfeils kann auf verschiedene Weise geändert werden:

- Für eine verloren gegangene Nachricht hängen Sie am Ende des Pfeils ein `x` an.
- Verwendung von `\` oder `/` anstelle von `<` oder `>`, um nur den unteren oder oberen Teil des Pfeils zu zeichnen.
- Verwendung von `>>` oder `//`, um eine nicht ausgefüllte Pfeilspitze zu zeichnen.
- Verwendung von `--` anstelle von `-`, um eine gestrichelte Linie zu zeichnen.
- Fügen Sie ein ”o” am Ende des Pfeil an
- benutzen Sie zweiseitige Pfeile `<->`

```
@startuml
Bob ->x Alice
Bob -> Alice
Bob ->> Alice
Bob -\ Alice
Bob \\- Alice
Bob //-- Alice

Bob ->o Alice
Bob o\\-- Alice
```

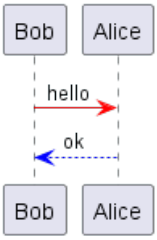
```
Bob <-> Alice
Bob <->o Alice
@enduml
```



1.8 Ändern der Pfeil Farbe

Sie können die Farbe einzelner Pfeile mit folgender Notation ändern:

```
@startuml
Bob -[#red]> Alice : hello
Alice -[#0000FF]->Bob : ok
@enduml
```



1.9 Nummerierung der Nachrichtenreihenfolge

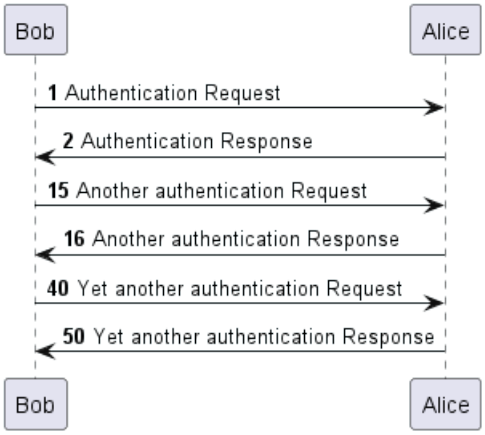
Das Schlüsselwort `autonumber` kann verwendet werden, um Nachrichten automatisch zu nummerieren.

```
@startuml
autonumber
Bob -> Alice : Authentication Request
Bob <- Alice : Authentication Response
@enduml
```

Sie können die Anfangsnummer *start* mit `autonumber //start//` festlegen und Sie können diese Nummer mit `autonumber //start// //increment//` um *increment* hochzählen.

```
@startuml
autonumber
Bob -> Alice : Authentication Request
Bob <- Alice : Authentication Response
```

```
autonumber 15
Bob -> Alice : Another authentication Request
Bob <- Alice : Another authentication Response

autonumber 40 10
Bob -> Alice : Yet another authentication Request
Bob <- Alice : Yet another authentication Response

@enduml
```

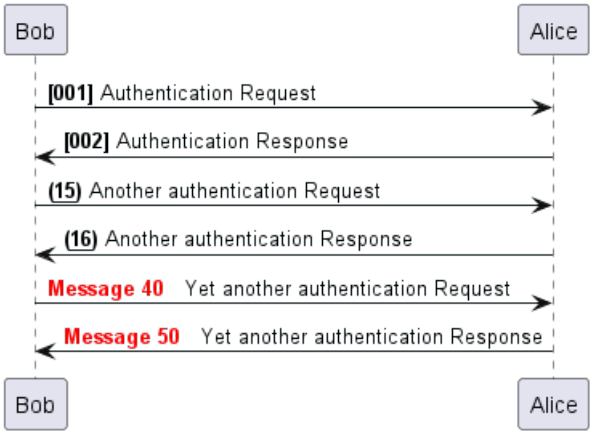


Man kann das Format der Aufzählung festlegen, indem man ein doppeltes Anführungszeichen verwendet.

Dazu wird die Java Klasse `DecimalFormat` verwendet (`0` bedeutet Ziffer, `#` bedeutet Ziffer und Null wenn die Ziffer fehlt.

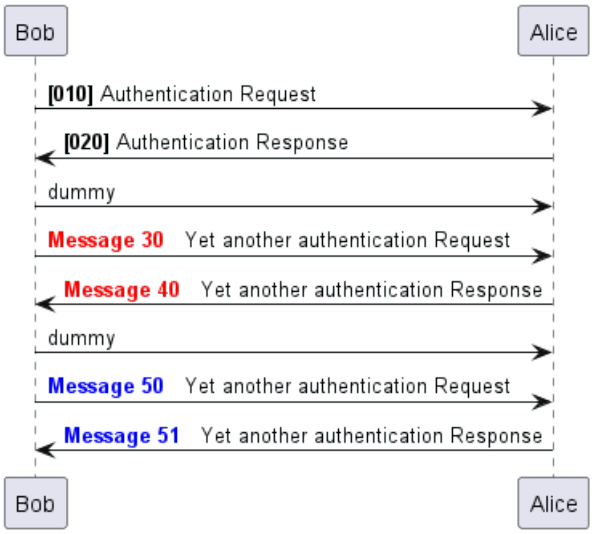
Außerdem können HTML Tags für die Formatierung verwendet werden.

```
@startuml
autonumber "<b>[000]"
Bob -> Alice : Authentication Request
Bob <- Alice : Authentication Response

autonumber 15 "<b>(<u>##</u>)"
Bob -> Alice : Another authentication Request
Bob <- Alice : Another authentication Response

autonumber 40 10 "<font color=red><b>Message 0  "
Bob -> Alice : Yet another authentication Request
Bob <- Alice : Yet another authentication Response

@enduml
```



Mit den Schlüsselwörtern `autonumber stop` bzw. `autonumber resume //increment// //format//` wird die Aufzählung pausiert bzw. wieder fortgesetzt.

```
@startuml
autonumber 10 10 "<b>[000]"
Bob -> Alice : Authentication Request
Bob <- Alice : Authentication Response

autonumber stop
Bob -> Alice : dummy

autonumber resume "<font color=red><b>Message 0  "
Bob -> Alice : Yet another authentication Request
Bob <- Alice : Yet another authentication Response

autonumber stop
Bob -> Alice : dummy

autonumber resume 1 "<font color=blue><b>Message 0  "
Bob -> Alice : Yet another authentication Request
Bob <- Alice : Yet another authentication Response
@enduml
```



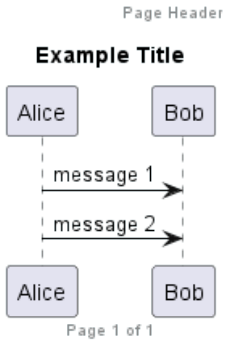
[Ref. [QA-7119](https://forum.plantuml.net/7119/create-links-after-creating-a-diagram?show=7137#a7137)]

1.10 Seiten Titel, Kopf und Fuß

Mit dem Schlüsselwort `title` fügt man einen Titel zur Seite hinzu.

Seiten können Kopf- und Fußzeilen mit `header` und `footer` mitgegeben werden.

```
@startuml

header Page Header
footer Page %page% of %lastpage%

title Example Title

Alice -> Bob : message 1
Alice -> Bob : message 2

@enduml
```



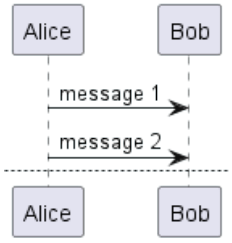
1.11 Aufteilung von Diagrammen

Das `newpage` Schlüsselwort wird verwendet, um ein Diagramm in mehrere Bilder aufzuteilen.

Man kann den Titel der neuen Seite direkt hinter dem `newpage` Schlüsselwort angeben.

Das ist sehr praktisch, um große Diagramme auf mehreren Seiten auszudrucken.

```
@startuml

Alice -> Bob : message 1
Alice -> Bob : message 2

newpage

Alice -> Bob : message 3
Alice -> Bob : message 4

newpage A title for the\nlast page

Alice -> Bob : message 5
Alice -> Bob : message 6
@enduml
```



1.12 Gruppierung von Nachrichten

Nachrichten können mit den folgenden Schlüsselwörtern gruppiert werden:

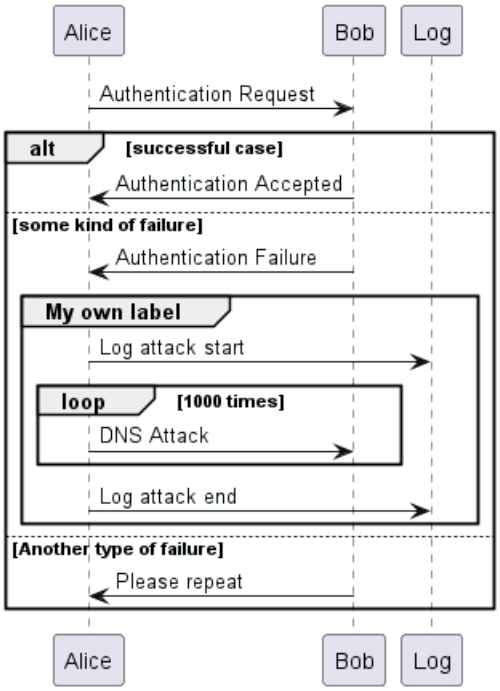
- `alt/else`
- `opt`
- `loop`
- `par`
- `break`
- `critical`
- `group`, gefolgt von einem anzuzeigenden Text

Es ist möglich einen Text anzugeben, der im Titel angezeigt werden soll.

Das `end` Schlüsselwort wird verwendet, um die Gruppe zu schließen.

Weiterhin ist es möglich, mehrere Gruppen ineinander zu schachteln.

```
@startuml
Alice -> Bob: Authentication Request

alt successful case

    Bob -> Alice: Authentication Accepted

else some kind of failure

    Bob -> Alice: Authentication Failure
    group My own label
    Alice -> Log : Log attack start
        loop 1000 times
            Alice -> Bob: DNS Attack
        end
    Alice -> Log : Log attack end
    end

else Another type of failure

   Bob -> Alice: Please repeat

end
@enduml
```

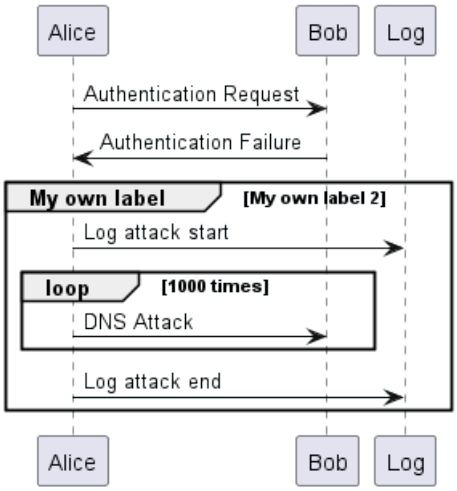


1.13 Zweites Label für group

Nach dem Schlüsselwort `group` kann man zwei Texte angeben. Der erste wird im Headerkästchen der Gruppe gezeigt, der zweite Text muss in eckige Klammern gestellt sein (`[` und `]`) und wird neben dem Headerkästchen angezeigt.

```
@startuml
Alice -> Bob: Authentication Request
Bob -> Alice: Authentication Failure
```

```
group My own label [My own label 2]
    Alice -> Log : Log attack start
    loop 1000 times
        Alice -> Bob: DNS Attack
    end
    Alice -> Log : Log attack end
end
@enduml
```



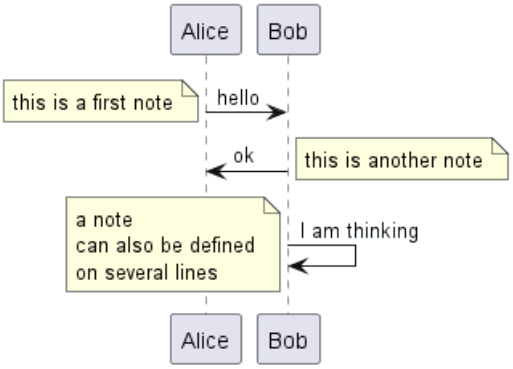
[Ref. QA-2503]

1.14 Notizen

Notizen zu einer Nachricht werden mit dem Schlüsselwort `note left` (links) oder `note right` (rechts) *gleich nach der Nachricht* eingeleitet.

Soll die Notiz mehrere Zeilen umfassen, muss das Schlüsselwort `end note` am Ende der Notiz verwendet werden..

```
@startuml
Alice->Bob : hello
note left: this is a first note

Bob->Alice : ok
note right: this is another note

Bob->Bob : I am thinking
note left
a note
can also be defined
on several lines
end note
@enduml
```



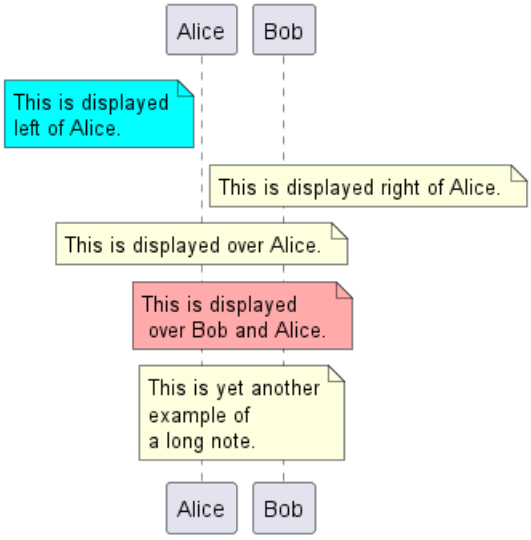
1.15 Weitere Möglichkeiten für Notizen

Weiterhin ist es Möglich, die Notizen rechts, links, oben oder unten an dem Teilnehmer zu platzieren:

Es ist möglich, die Notizen durch die Änderung der Hintergrundfarbe hervorzuheben.

Außerdem kann man durch die Verwendung des `end note` Schlüsselwortes mehrzeilige Notizen erzeugen.

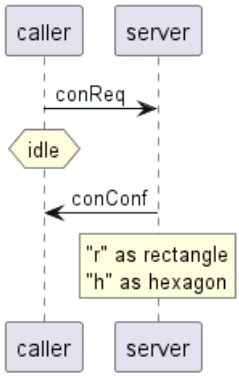
```
@startuml
participant Alice
participant Bob
note left of Alice #aqua
This is displayed
left of Alice.
end note

note right of Alice: This is displayed right of Alice.

note over Alice: This is displayed over Alice.

note over Alice, Bob #FFAAAA: This is displayed\n over Bob and Alice.

note over Bob, Alice
This is yet another
example of
a long note.
end note
@enduml
```



1.16 Ändern der Form von Notizen

Mit den Schlüsselwörtern `hnote` und `rnote` kann man die Form der Notiz ändern.

```
@startuml
caller -> server : conReq
hnote over caller : idle
caller <- server : conConf
rnote over server
 "r" as rectangle
 "h" as hexagon
endrnote
@enduml
```



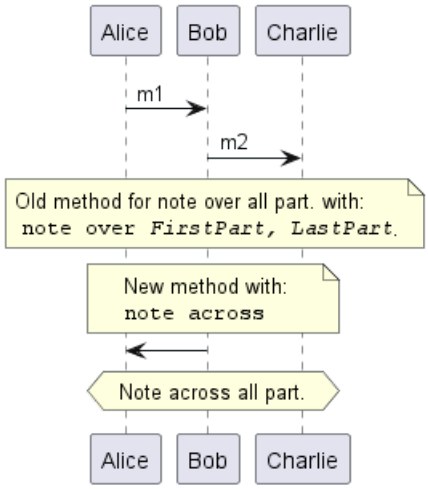
[Ref. [QA-1765](https://forum.plantuml.net/1765/is-it-possible-to-have-different-shapes-for-notes?show=1806#c1806)]

1.17 Note over all participants [across]

You can directly make a note over all participants, with the syntax:

- `note across: note_description`

```
@startuml
Alice->Bob:m1
Bob->Charlie:m2
note over Alice, Charlie: Old method for note over all part. with:\n ""note over //FirstPart, LastPa
note across: New method with:\n""note across""
Bob->Alice
hnote across:Note across all part.
@enduml
```



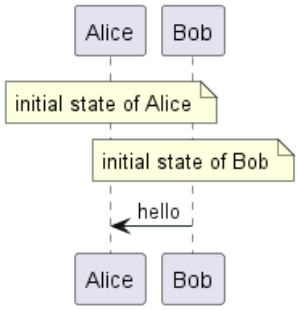
[Ref. QA-9738]

1.18 Several notes aligned at the same level [/]

You can make several notes aligned at the same level, with the syntax `/`:

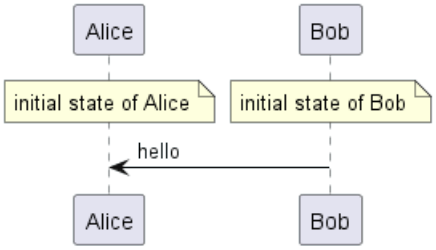
- without `/` *(by default, the notes are not aligned)*

```
@startuml
note over Alice : initial state of Alice
note over Bob : initial state of Bob
Bob -> Alice : hello
@enduml
```



- with `/` *(the notes are aligned)*

```
@startuml
note over Alice : initial state of Alice
/ note over Bob : initial state of Bob
Bob -> Alice : hello
@enduml
```



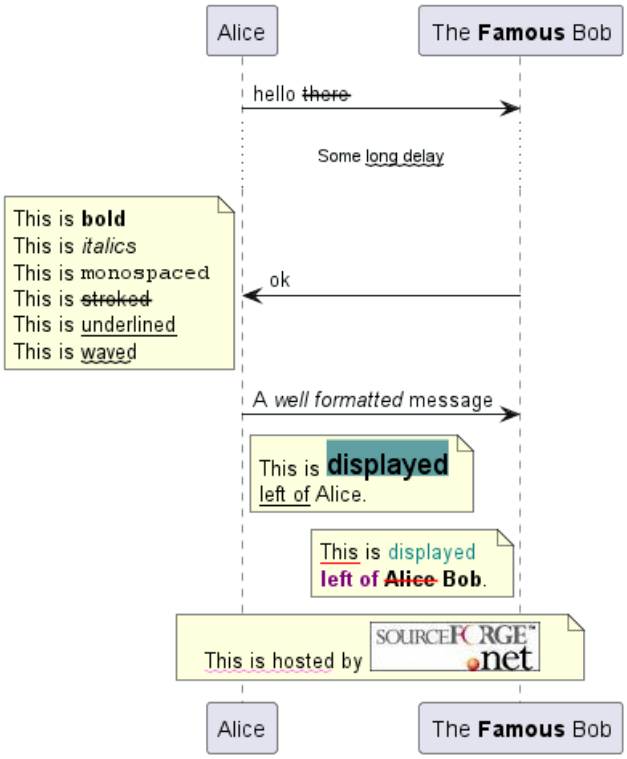
[Ref. QA-354]

1.19 Creole und HTML

Es ist auch möglich, den Text mit Creole-Markup zu formatieren.

```
@startuml
participant Alice
participant "The **Famous** Bob" as Bob

Alice -> Bob : hello --there--
... Some ~~long delay~~ ...
Bob -> Alice : ok
note left
  This is **bold**
  This is //italics//
  This is ""monospaced""
  This is --stroked--
  This is __underlined__
  This is ~~waved~~
end note

Alice -> Bob : A //well formatted// message
```

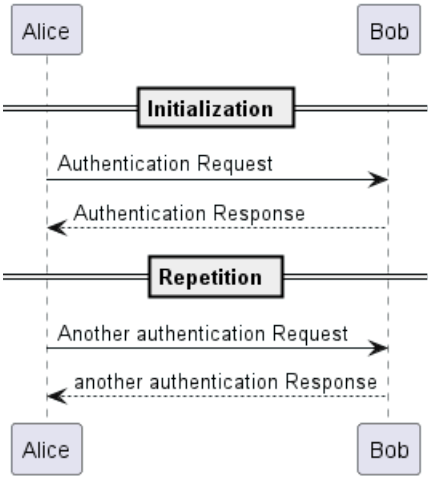
```
note right of Alice
 This is <back:cadetblue><size:18>displayed</size></back>
 __left of__ Alice.
end note
note left of Bob
 <u:red>This</u> is <color #118888>displayed</color>
 **<color purple>left of</color> <s:red>Alice</strike> Bob**.
end note
note over Alice, Bob
 <w:#FF33FF>This is hosted</w> by <img sourceforge.jpg>
end note
@enduml
```



1.20 Diagramme aufteilen

Bei Bedarf kann ein Diagramm mit dem "==" Separator in logische Schritte unterteilt werden.

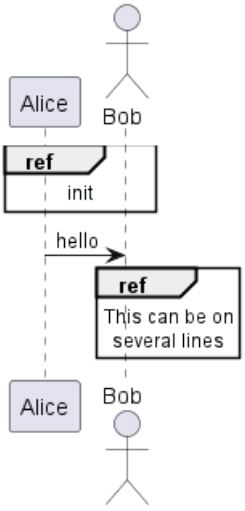
```
@startuml

== Initialization ==

Alice -> Bob: Authentication Request
Bob --> Alice: Authentication Response

== Repetition ==

Alice -> Bob: Another authentication Request
Alice <-- Bob: another authentication Response

@enduml
```



1.21 Referenz

Die Referenz kann in einem Diagramm mit Hilfe des Schlüsselwortes `ref over` verwendet werden.

```
@startuml
participant Alice
actor Bob

ref over Alice, Bob : init

Alice -> Bob : hello

ref over Bob
  This can be on
  several lines
end ref
@enduml
```

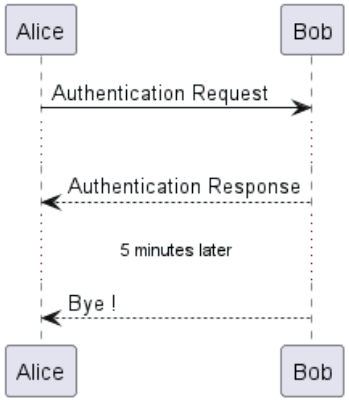


1.22 Verzögerungen

Mit `...` kann man eine Verzögerung in dem Diagramm anzeigen. In dieser Verzögerung kann außerdem eine Nachricht angezeigt werden.

```
@startuml

Alice -> Bob: Authentication Request
```

```
...
Bob --> Alice: Authentication Response
...5 minutes later...
Bob --> Alice: Bye !

@enduml
```

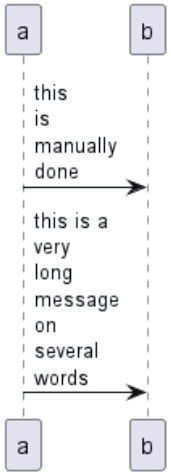


1.23 Text wrapping

To break long messages, you can manually add in your text.

Another option is to use `maxMessageSize` setting:

```
@startuml
skinparam maxMessageSize 50
participant a
participant b
a -> b :this\nis\nmanually\ndone
a -> b :this is a very long message on several words
@enduml
```



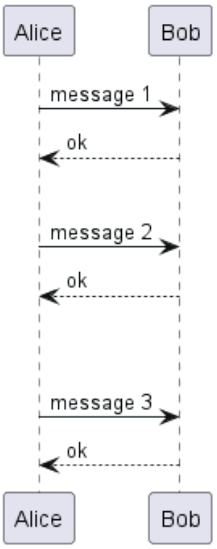
1.24 Abstände

Mit `|||` kann ein Abstand zwischen zwei Nachrichten eingefügt werden.

Außerdem ist es möglich, die Größe des Abstandes in Pixeln festzulegen.

```
@startuml

Alice -> Bob: message 1
Bob --> Alice: ok
|||
```

```
Alice -> Bob: message 2
Bob --> Alice: ok
||45||
Alice -> Bob: message 3
Bob --> Alice: ok

@enduml
```



1.25 Aktivierung und Deaktivierung der Lebenslinie

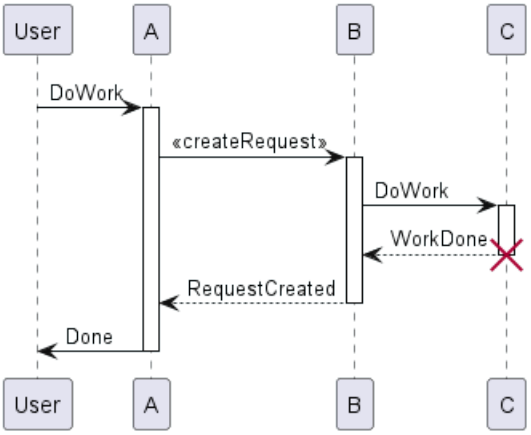
Mit den Befehlen `activate` und `deactivate` können die Teilnehmer aktiviert und deaktiviert werden.

Wenn ein Teilnehmer aktiviert wurde, dann erscheint seine Lebenlinie.

Die Befehle `activate` und `deactivate` wirken nach der vorhergehenden Nachricht.

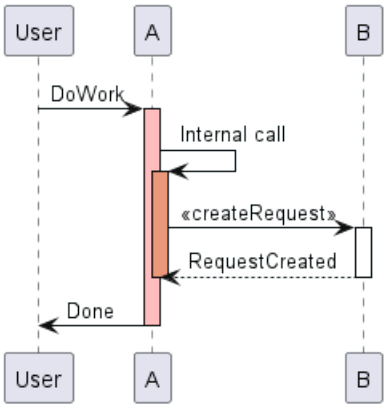
Der Befehl `destroy` beendet die Lebenslinie eines Teilnehmers.

```
@startuml
participant User

User -> A: DoWork
activate A

A -> B: << createRequest >>
activate B

B -> C: DoWork
activate C
C --> B: WorkDone
destroy C

B --> A: RequestCreated
deactivate B

A -> User: Done
deactivate A

@enduml
```



Es ist auch möglich, geschachtelte Lebenslinien zu erzeugen. Außerdem kann man einer Lebenslinie eine Farbe zuweisen.

```
@startuml
participant User

User -> A: DoWork
activate A #FFBBBB

A -> A: Internal call
activate A #DarkSalmon

A -> B: << createRequest >>
activate B

B --> A: RequestCreated
deactivate B
deactivate A
A -> User: Done
deactivate A

@enduml
```

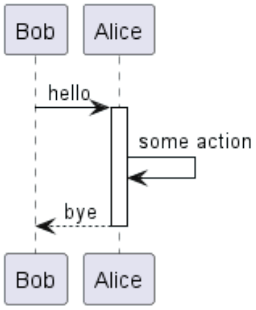


1.26 Return

A new command `return` for generating a return message with optional text label. The point returned to is the point that cause the most recently activated life-line. The syntax is simply return label where label, if provided, can be any string acceptable on conventional messages.

```
@startuml
Bob -> Alice : hello
```

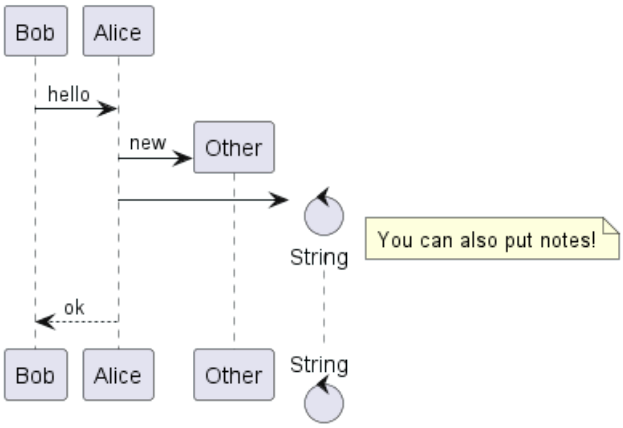
```
activate Alice
Alice -> Alice : some action
return bye
@enduml
```



1.27 Erstellung von Teilnehmern

Das `create` Schlüsselwort kann kurz vor dem ersten Empfang einer Nachricht verwendet werden, um anzuzeigen, das die Nachricht für die *Erstellung* des neuen Objektes verantwortlich ist.

```
@startuml
Bob -> Alice : hello

create Other
Alice -> Other : new

create control String
Alice -> String
note right : You can also put notes!

Alice --> Bob : ok

@enduml
```

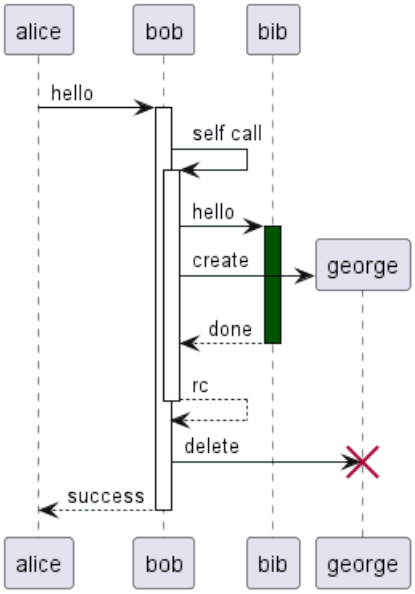


1.28 Shortcut syntax for activation, deactivation, creation

Immediately after specifying the target participant, the following syntax can be used:

- `++` Activate the target (optionally a #color may follow this)
- `--` Deactivate the source
- `**` Create an instance of the target
- `!!` Destroy an instance of the target

```
@startuml
alice -> bob ++ : hello
bob -> bob ++ : self call
bob -> bib ++  #005500 : hello
bob -> george ** : create
return done
return rc
bob -> george !! : delete
return success
@enduml
```



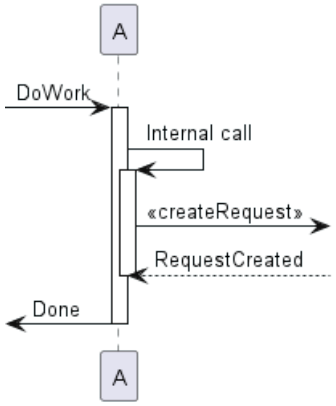
*[Ref. [QA-4834](https:*forum.plantuml.net/4834/activation-shorthand-for-sequence-diagrams?show=13054#c13054), [QA-9573](https:*forum.plantuml.net/9573) and [QA-13234](https://forum.plantuml.net/13234)]*

1.29 Eingehende und ausgehende Nachrichten

Um sich nur auf ein Teil des Diagramms zu konzentrieren, kann man eingehende und ausgehende Pfeile verwenden.

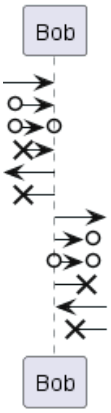
Mit eckigen Klammern kann man die linke "`[`" oder die rechte "`]`" Seite des Pfeils festlegen.

```
@startuml
[-> A: DoWork

activate A

A -> A: Internal call
activate A

A ->] : << createRequest >>

A<--] : RequestCreated
deactivate A
[<- A: Done
deactivate A
@enduml
```



Die folgende Syntax ist auch möglich:

```
@startuml
[-> Bob
[o-> Bob
[o->o Bob
[x-> Bob

[<- Bob
[x<- Bob

Bob ->]
Bob ->o]
Bob o->o]
Bob ->x]

Bob <-]
Bob x<-]
@enduml
```

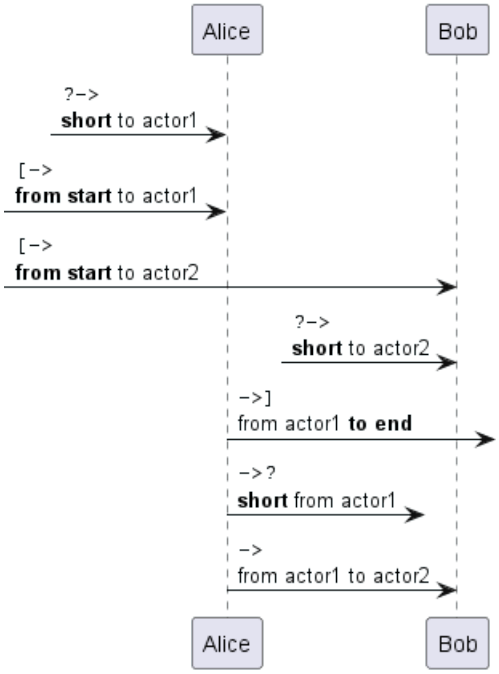


1.30 Kurze Pfeile für eingehende und ausgehende Nachrichten

Es gibt **kurze** Pfeile indem man `?` verwendet.

```
@startuml
?-> Alice    : ""?->""\n**short** to actor1
[-> Alice    : ""[->""\n**from start** to actor1
[-> Bob      : ""[->""\n**from start** to actor2
?-> Bob      : ""?->""\n**short** to actor2
Alice ->]    : ""->]""\nfrom actor1 **to end**
Alice ->?    : ""->?""\n**short** from actor1
Alice -> Bob : ""->"" \nfrom actor1 to actor2
```

```
@enduml
```

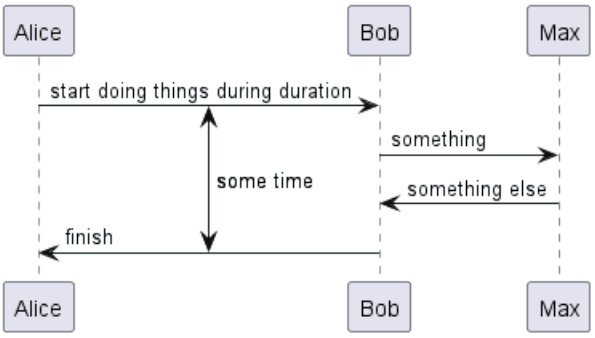


[Ref. QA-310]

1.31 Anchors and Duration

With `teoz` usage it is possible to add anchors to the diagram and use the anchors to specify duration time.

```
@startuml
!pragma teoz true

{start} Alice -> Bob : start doing things during duration
Bob -> Max : something
Max -> Bob : something else
{end} Bob -> Alice : finish

{start} <-> {end} : some time

@enduml
```



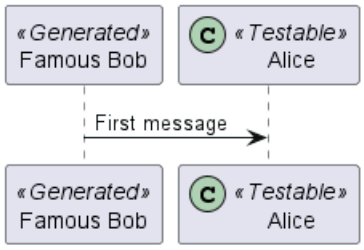
You can use the ‘-P‘ command-line option to specify the pragma: “‘ java -jar plantuml.jar -Pteoz=true “‘ *[Ref. [issue-582](https://github.com/plantuml/plantuml/issues/582)]*

1.32 Stereotypen

Man kann den Objekten Stereotypen zuweisen, indem man den Stereotyp mit zwei spitzen öffnenden "`<<`" und schließenden Klammern "`>>`" umschließt.

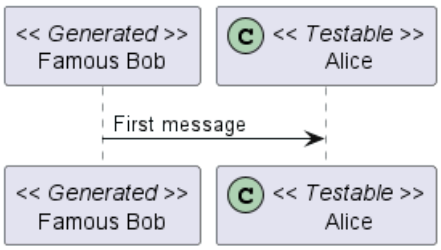
Innerhalb des Stereotypen ist es möglich einen hervorgehobenen Buchstaben hinzuzufügen, der in einem farbigen Kreis dargestellt wird. Dazu verwendet man die folgende Syntax: "`(X,color)`".

```
@startuml

participant "Famous Bob" as Bob << Generated >>
participant Alice << (C,#ADD1B2) Testable >>

Bob->Alice: First message

@enduml
```

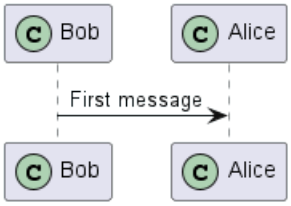


Standardgemäß werden *französisches Anführungszeichen* verwendet, um den Sterotyp zu kennzeichnen. Dieses Verhalten kann über den `skinparam guillemet` Befehl beeinflusst werden.

```
@startuml

skinparam guillemet false
participant "Famous Bob" as Bob << Generated >>
participant Alice << (C,#ADD1B2) Testable >>

Bob->Alice: First message

@enduml
```



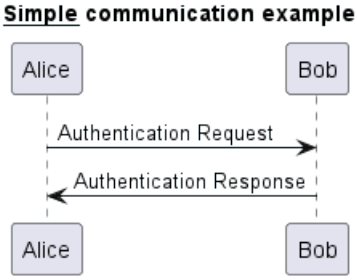

```
@startuml

participant Bob << (C,#ADD1B2) >>
participant Alice << (C,#ADD1B2) >>

Bob->Alice: First message

@enduml
```



1.33 Mehr Information zu Überschriften

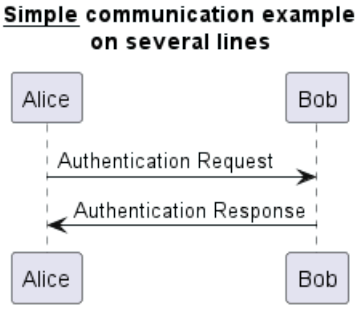
Mit Creole-Markup ist es möglich, die Überschrift des Diagramms zu formatieren.

```
@startuml

title __Simple__ **communication** example

Alice -> Bob: Authentication Request
Bob -> Alice: Authentication Response

@enduml
```



Eine neue Zeile kann mit in die Überschrift der Bezeichnung eingetragen werden.

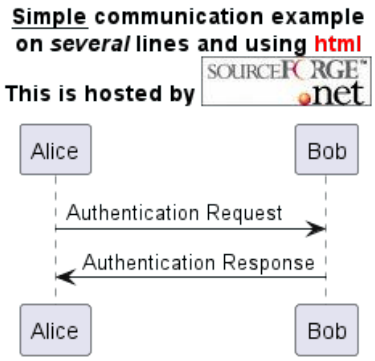
```
@startuml

title __Simple__ communication example\non several lines

Alice -> Bob: Authentication Request
Bob -> Alice: Authentication Response

@enduml
```



Mehrzeilige Überschriften können mit den `title` und `end title` Schlüsselwörtern erstellt werden.

```
@startuml

title
 <u>Simple</u> communication example
 on <i>several</i> lines and using <font color=red>html</font>
 This is hosted by <img:sourceforge.jpg>
```

```
end title

Alice -> Bob: Authentication Request
Bob -> Alice: Authentication Response

@enduml
```

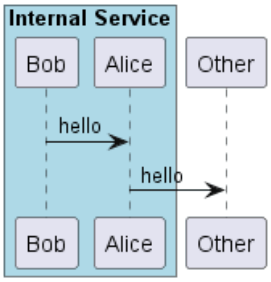


1.34 Anpassungen bei den Teilnehmern

Es ist möglich Boxen um Teilnehmer zu zeichnen, indem man die Befehle `box` und `end box` benutzt.

Man kann optional noch einen Titel oder eine Hintergrundfarbe nach dem `box` Schlüsselwort hinzufügen.

```
@startuml

box "Internal Service" #LightBlue
participant Bob
participant Alice
end box
participant Other

Bob -> Alice : hello
Alice -> Other : hello

@enduml
```

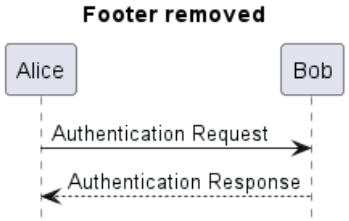


1.35 Fußzeile entfernen

Die Fußzeile eines Diagramms kann mit dem `hide footbox` Schlüsselwort entfernt werden.

```
@startuml

hide footbox
title Footer removed

Alice -> Bob: Authentication Request
Bob --> Alice: Authentication Response
```

```
@enduml
```



1.36 Der Skinparam Befehl

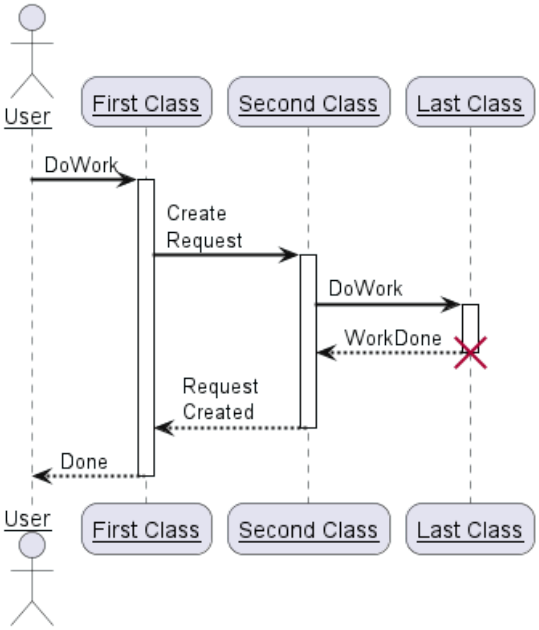
Mit dem skinparam Befehl kann die Farbe und die Schriftart der Zeichnung verändert werden.

Sie können den Befehl auf die folgenden Arten verwenden:

- Wie alle ander Befehle In einer Diagrammdefinition,
- in einer Include-Datei,
- In einer Konfigurationsdatei, die durch die Kommandozeile oder den ANT-Task übergeben wird.

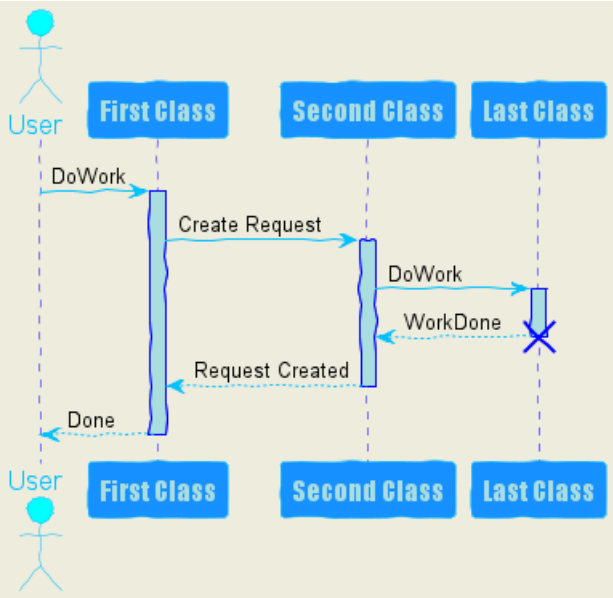
Es ist auch möglich, weitere Parameter zu editieren. Dies ist in den folgenden Beispielen dargestellt:

```
@startuml
skinparam sequenceArrowThickness 2
skinparam roundcorner 20
skinparam maxmessagesize 60
skinparam sequenceParticipant underline

actor User
participant "First Class" as A
participant "Second Class" as B
participant "Last Class" as C

User -> A: DoWork
activate A

A -> B: Create Request
activate B

B -> C: DoWork
activate C
C --> B: WorkDone
destroy C

B --> A: Request Created
deactivate B

A --> User: Done
deactivate A

@enduml
```




```
@startuml
skinparam backgroundColor #EEEBDC
skinparam handwritten true

skinparam sequence {
ArrowColor DeepSkyBlue
ActorBorderColor DeepSkyBlue
LifeLineBorderColor blue
LifeLineBackgroundColor #A9DCDF

ParticipantBorderColor DeepSkyBlue
ParticipantBackgroundColor DodgerBlue
ParticipantFontName Impact
ParticipantFontSize 17
ParticipantFontColor #A9DCDF

ActorBackgroundColor aqua
ActorFontColor DeepSkyBlue
ActorFontSize 17
ActorFontName Aapex
}

actor User
participant "First Class" as A
participant "Second Class" as B
participant "Last Class" as C

User -> A: DoWork
activate A

A -> B: Create Request
activate B

B -> C: DoWork
activate C
C --> B: WorkDone
destroy C
```

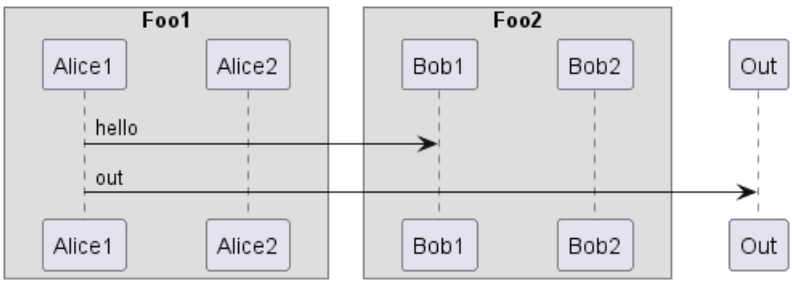
```
B --> A: Request Created
deactivate B

A --> User: Done
deactivate A

@enduml
```



1.37 Anpassung von Abstandswerten

Einige Werte, die den Abstand zwischen Elementen definieren, können angepasst werden.

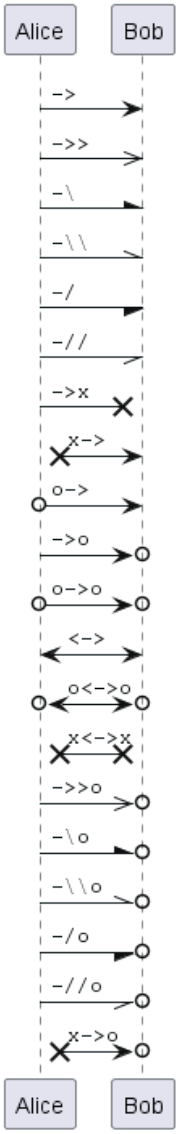
```
@startuml
skinparam ParticipantPadding 20
skinparam BoxPadding 10

box "Foo1"
participant Alice1
participant Alice2
end box
box "Foo2"
participant Bob1
participant Bob2
end box
Alice1 -> Bob1 : hello
Alice1 -> Out : out
@enduml
```



1.38 Appendix: Examples of all arrow type

1.38.1 Normal arrow

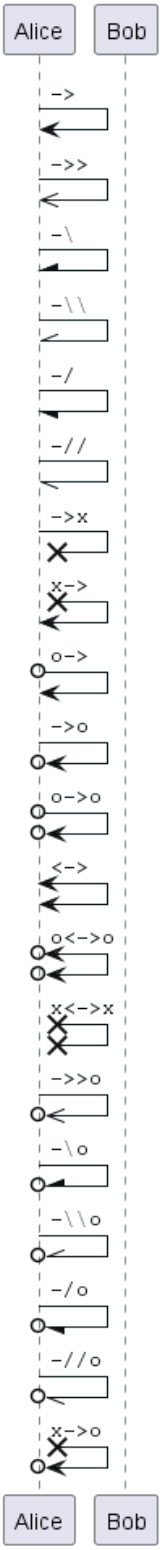
```
@startuml
participant Alice as a
participant Bob   as b
a ->     b : ""->   ""
a ->>    b : ""->>  ""
a -\     b : ""-\   ""
a -\\    b : ""-\\\\""
a -/     b : ""-/   ""
a -//    b : ""-//  ""
a ->x    b : ""->x  ""
a x->    b : ""x->  ""
a o->    b : ""o->  ""
a ->o    b : ""->o  ""
a o->o   b : ""o->o ""
a <->    b : ""<->  ""
a o<->o  b : ""o<->o""
a x<->x  b : ""x<->x""
a ->>o   b : ""->>o ""
a -\o    b : ""-\o  ""
a -\\o   b : ""-\\\\o""
a -/o    b : ""-/o  ""
a -//o   b : ""-//o ""
a x->o   b : ""x->o ""
@enduml
```



1.38.2 Itself arrow

```
@startuml
participant Alice as a
participant Bob   as b
a ->     a : ""->   ""
a ->>    a : ""->>  ""
a -\     a : ""-\   ""
a -\\    a : ""-\\\\""
a -/     a : ""-/   ""
a -//    a : ""-//  ""
a ->x    a : ""->x  ""
a x->    a : ""x->  ""
a o->    a : ""o->  ""
a ->o    a : ""->o  ""
a o->o   a : ""o->o ""
a <->    a : ""<->  ""
a o<->o  a : ""o<->o""
a x<->x  a : ""x<->x""
a ->>o   a : ""->>o ""
a -\o    a : ""-\o  ""
a -\\o   a : ""-\\\\o""
```

```
a -/o    a : ""-/o  ""
a -//o   a : ""-//o ""
a x->o   a : ""x->o ""
@enduml
```

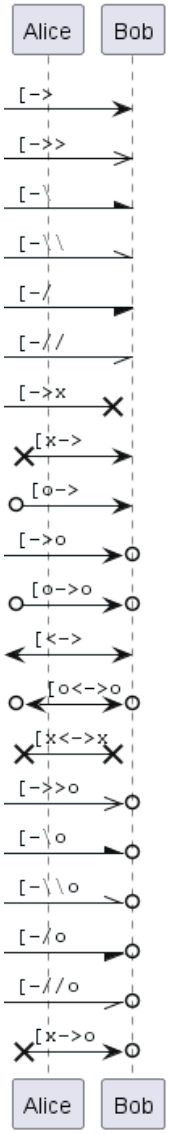


1.38.3 Incoming and outgoing messages (with '[', ']')

1.38.4 Incoming messages (with '[')

```
@startuml
```

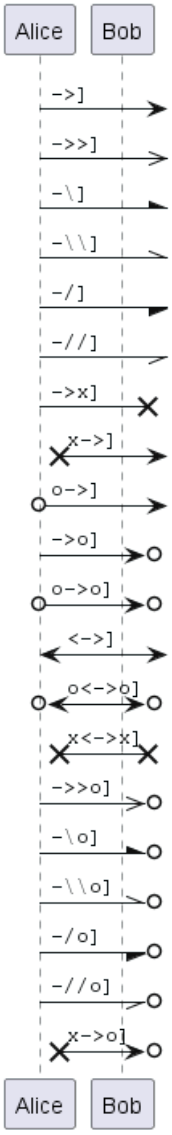
```
participant Alice as a
participant Bob   as b
[->      b : ""[->   ""
[->>     b : ""[->>  ""
[-\      b : ""[-\   ""
[-\\     b : ""[-\\\\""
[-/      b : ""[-/   ""
[-//     b : ""[-//  ""
[->x     b : ""[->x  ""
[x->     b : ""[x->  ""
[o->     b : ""[o->  ""
[->o     b : ""[->o  ""
[o->o    b : ""[o->o ""
[<->     b : ""[<->  ""
[o<->o   b : ""[o<->o""
[x<->x   b : ""[x<->x""
[->>o    b : ""[->>o ""
[-\o     b : ""[-\o  ""
[-\\o    b : ""[-\\\\o""
[-/o     b : ""[-/o  ""
[-//o    b : ""[-//o ""
[x->o    b : ""[x->o ""
@enduml
```



1.38.5 Outgoing messages (with ']')

```
@startuml
participant Alice as a
participant Bob   as b
a ->]       : ""->]   ""
a ->>]      : ""->>]  ""
a -\]       : ""-\]   ""
a -\\]      : ""-\\\\]""
a -/]       : ""-/]   ""
a -//]      : ""-//]  ""
a ->x]      : ""->x]  ""
a x->]      : ""x->]  ""
a o->]      : ""o->]  ""
a ->o]      : ""->o]  ""
a o->o]     : ""o->o] ""
a <->]      : ""<->]  ""
a o<->o]    : ""o<->o]""
a x<->x]    : ""x<->x]""
a ->>o]     : ""->>o] ""
a -\o]      : ""-\o]  ""
a -\\o]     : ""-\\\\o]""
```

```
a -/o]      : ""-/o]  ""
a -//o]     : ""-//o] ""
a x->o]     : ""x->o] ""
@enduml
```

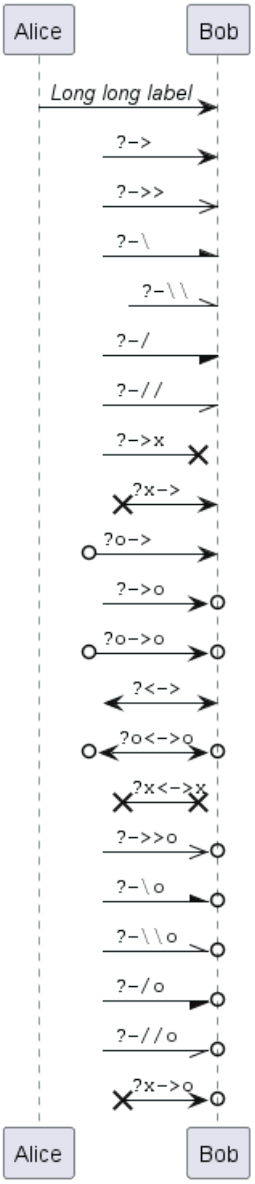


1.38.6 Short incoming and outgoing messages (with '?')

1.38.7 Short incoming (with '?')

```
@startuml
participant Alice as a
participant Bob   as b
a ->     b : //Long long label//
?->      b : ""?->   ""
?->>     b : ""?->>  ""
?-\      b : ""?-\   ""
?-\\     b : ""?-\\\\""
?-/      b : ""?-/   ""
?-//     b : ""?-//  ""
?->x     b : ""?->x  ""
?x->     b : ""?x->  ""
?o->     b : ""?o->  ""
?->o     b : ""?->o  ""
```

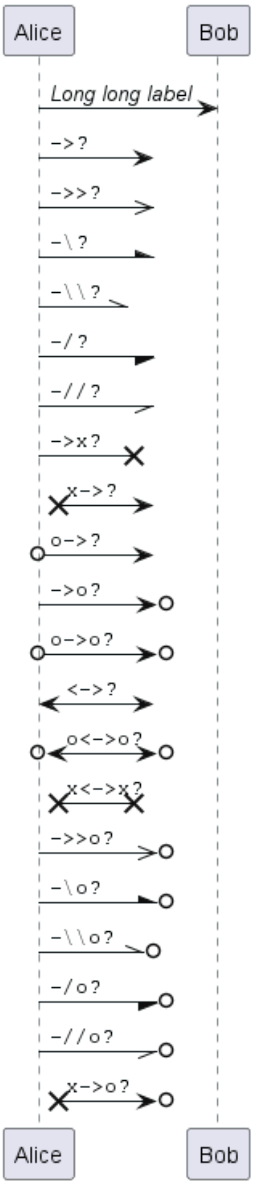
```
?o->o    b : ""?o->o ""
?<->     b : ""?<->  ""
?o<->o   b : ""?o<->o""
?x<->x   b : ""?x<->x""
?->>o    b : ""?->>o ""
?-\o     b : ""?-\o  ""
?-\\o    b : ""?-\\\\o ""
?-/o     b : ""?-/o  ""
?-//o    b : ""?-//o ""
?x->o    b : ""?x->o ""
@enduml
```



1.38.8 Short outgoing (with '?')

```
@startuml
participant Alice as a
participant Bob   as b
a ->     b : //Long long label//
a ->?      : ""->?   ""
a ->>?     : ""->>?  ""
a -\?      : ""-\?   ""
```

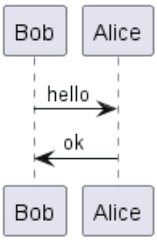
```
a -\\?      : ""-\\\\?""
a -/?       : ""-/?   ""
a -//?      : ""-//?  ""
a ->x?      : ""->x?  ""
a x->?      : ""x->?  ""
a o->?      : ""o->?  ""
a ->o?      : ""->o?  ""
a o->o?     : ""o->o? ""
a <->?      : ""<->?  ""
a o<->o?    : ""o<->o?""
a x<->x?    : ""x<->x?""
a ->>o?     : ""->>o? ""
a -\o?      : ""-\o?  ""
a -\\o?     : ""-\\\\o?""
a -/o?      : ""-/o?  ""
a -//o?     : ""-//o? ""
a x->o?     : ""x->o? ""
@enduml
```



1.39 Specific SkinParameter

1.39.1 By default

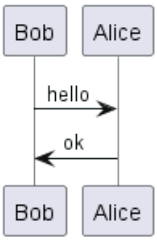
```
@startuml
Bob -> Alice : hello
Alice -> Bob : ok
@enduml
```



1.39.2 LifelineStrategy

- nosolid *(by default)*

```
@startuml
skinparam lifelineStrategy nosolid
Bob -> Alice : hello
Alice -> Bob : ok
@enduml
```

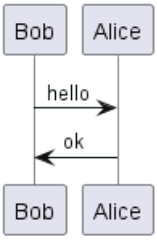


[Ref. QA-9016]

- solid

In order to have solid life line in sequence diagrams, you can use: `skinparam lifelineStrategy solid`

```
@startuml
skinparam lifelineStrategy solid
Bob -> Alice : hello
Alice -> Bob : ok
@enduml
```



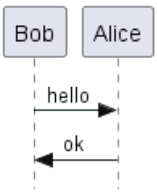
[Ref. QA-2794]

1.39.3 style strictuml

To be conform to strict UML (*for arrow style: emits triangle rather than sharp arrowheads*), you can use:

- `skinparam style strictuml`

```
@startuml
skinparam style strictuml
Bob -> Alice : hello
Alice -> Bob : ok
@enduml
```

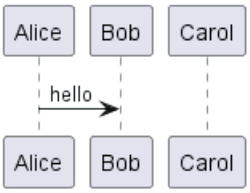


[Ref. QA-1047]

1.40 Hide unlinked participant

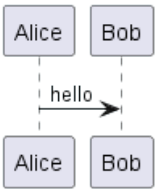
By default, all participants are displayed.

```
@startuml
participant Alice
participant Bob
participant Carol

Alice -> Bob : hello
@enduml
```



But you can `hide unlinked` participant.

```
@startuml
hide unlinked
participant Alice
participant Bob
participant Carol

Alice -> Bob : hello
@enduml
```



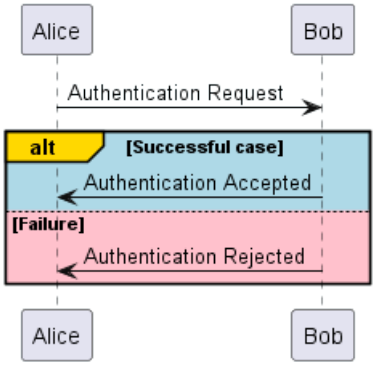
[Ref. QA-4247]

1.41 Color a group message

It is possible to color a group messages:

```
@startuml
Alice -> Bob: Authentication Request
alt#Gold #LightBlue Successful case
    Bob -> Alice: Authentication Accepted
```

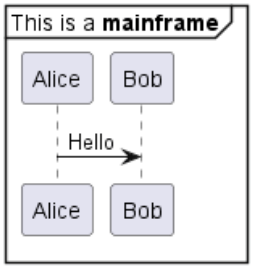
```
else #Pink Failure
    Bob -> Alice: Authentication Rejected
end
@enduml
```



[Ref. QA-4750 and QA-6410]

1.42 Mainframe

```
@startuml
mainframe This is a **mainframe**
Alice->Bob : Hello
@enduml
```



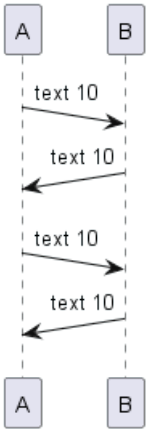
[Ref. QA-4019 and Issue#148]

1.43 Slanted or odd arrows

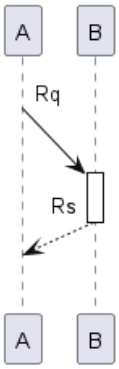
You can use the `(nn)` option (before or after arrow) to make the arrows slanted, where *nn* is the number of shift pixels.

[Available only after v1.2022.6beta+]

```
@startuml
A ->(10) B: text 10
B ->(10) A: text 10

A ->(10) B: text 10
A (10)<- B: text 10
@enduml
```

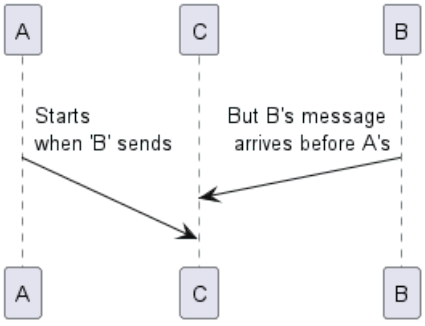



```
@startuml
A ->(40) B++: Rq
B -->(20) A--: Rs
@enduml
```



[Ref. QA-14145]

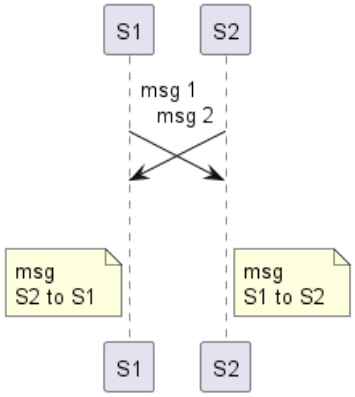
```
@startuml
!pragma teoz true
A ->(50) C: Starts\nwhen 'B' sends
& B ->(25) C: \nBut B's message\n arrives before A's
@enduml
```



[Ref. QA-6684]

```
@startuml
!pragma teoz true

S1 ->(30) S2: msg 1\n
& S2 ->(30) S1: msg 2

note left S1: msg\nS2 to S1
& note right S2: msg\nS1 to S2
```

```
@enduml
```



[Ref. QA-1072]

2 Anwendungsfall-Diagramm

Let's have few examples :

Note that you can disable the shadowing using the `skinparam shadowing false` command.

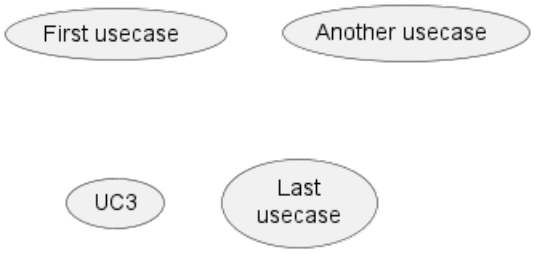
PlantUML offers a unique approach to creating use case diagrams through its text-based language. One of the primary advantages of using PlantUML is its **simplicity and efficiency**. Instead of manually drawing shapes and connections, users can define their diagrams using intuitive and concise textual descriptions. This not only speeds up the diagram creation process but also ensures **consistency and accuracy**. The ability to integrate with various documentation platforms and its wide range of supported output formats make PlantUML a versatile tool for both developers and non-developers. Lastly, being **open-source**, PlantUML boasts a [strong community](https://forum.plantuml.net/) that continually contributes to its improvement and offers a wealth of resources for users at all levels.

2.1 Anwendungsfälle

Anwendungsfälle sind von zwei Klammern eingeschossen (da zwei Klammern wie ein Oval aussehen).

Alternativ kann man das `usecase` Schlüsselwort verwenden, um einen Anwendungsfall zu definieren. Außerdem ist es möglich, einen Alias mit dem `as` Schlüsselwort zu definieren. Dieser Alias wird dann verwendet wenn die Beziehungen festgelegt werden.

```
@startuml

(First usecase)
(Another usecase) as (UC2)
usecase UC3
usecase (Last\nusecase) as UC4

@enduml
```



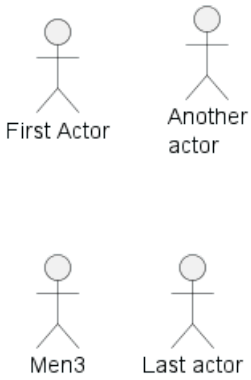
2.2 Akteure

Die Namen von Akteuren werden von zwei Doppelpunkten umschlossen.

Mann kann aber auch das `actor` Schlüsselwort verwenden um einen Akteur zu definieren. Außerdem ist es möglich, mit dem `as` Schlüsselwort einen Alias festzulegen. Dieser Alias wird dann später verwendet, wenn die Beziehungen festgelegt werden.

Wie wir sehen werden, ist die Definition eines Akteur nicht zwingend notwendig.

```
@startuml

:First Actor:
:Another\nactor: as Men2
actor Men3
actor :Last actor: as Men4

@enduml
```



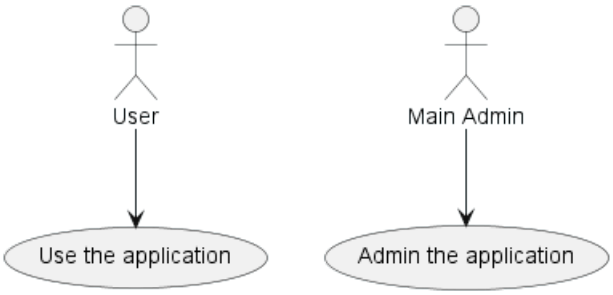
2.3 Change Actor style

You can change the actor style from stick man *(by default)* to:

- an awesome man with the `skinparam actorStyle awesome` command;
- a hollow man with the `skinparam actorStyle hollow` command.

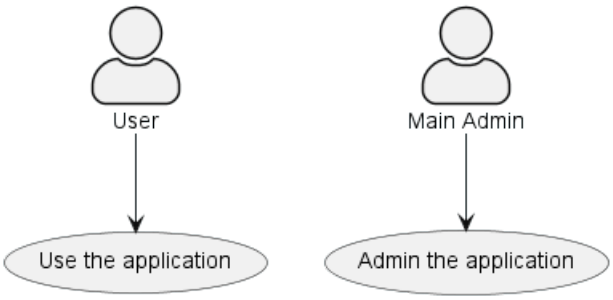
2.3.1 Stick man *(by default)*

```
@startuml
:User: --> (Use)
"Main Admin" as Admin
"Use the application" as (Use)
Admin --> (Admin the application)
@enduml
```



2.3.2 Awesome man

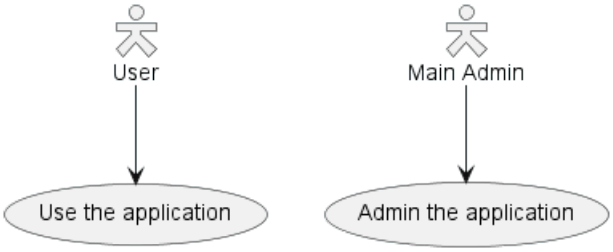
```
@startuml
skinparam actorStyle awesome
:User: --> (Use)
"Main Admin" as Admin
"Use the application" as (Use)
Admin --> (Admin the application)
@enduml
```



[Ref. QA-10493]

2.3.3 Hollow man

```
@startuml
skinparam actorStyle Hollow
:User: --> (Use)
"Main Admin" as Admin
"Use the application" as (Use)
Admin --> (Admin the application)
@enduml
```



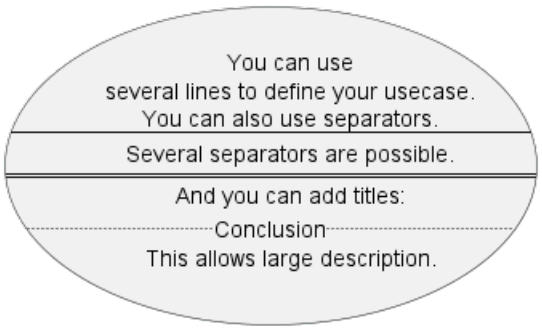
[Ref. PR#396]

2.4 Beschreibung der Anwendungsfälle

Falls sich eine Beschreibung über mehrere Zeilen ersterckt, kann diese mit Anführungsstrichen eingeschlossen werden.

Außerdem kann man die folgenden Seperatoren verwenden: `--` `..` `==` `__`. Außerdem kann man Überschriften innerhalb der Seperatoren verwenden.

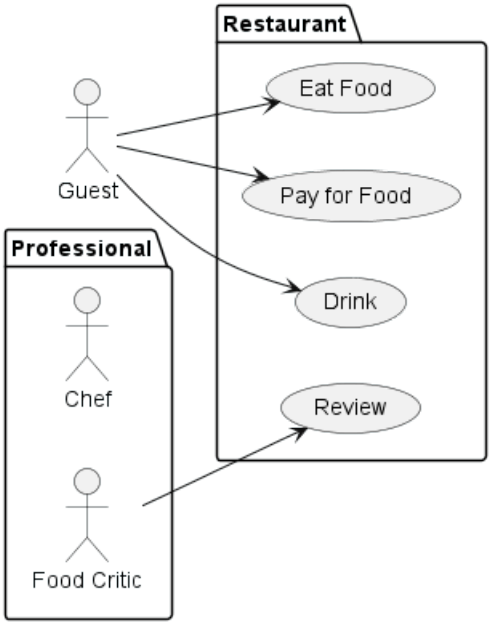
```
@startuml

usecase UC1 as "You can use
several lines to define your usecase.
You can also use separators.
--
Several separators are possible.
==
And you can add titles:
..Conclusion..
This allows large description."

@enduml
```



2.5 Use package

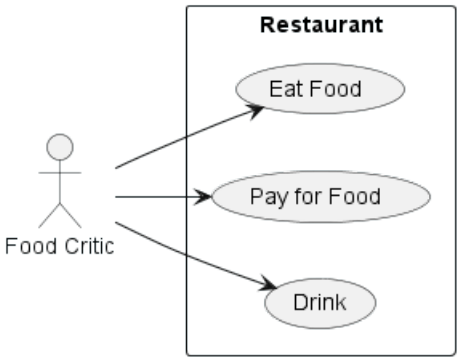
You can use packages to group actors or use cases.

```
@startuml
left to right direction
actor Guest as g
package Professional {
  actor Chef as c
  actor "Food Critic" as fc
}
package Restaurant {
  usecase "Eat Food" as UC1
  usecase "Pay for Food" as UC2
  usecase "Drink" as UC3
  usecase "Review" as UC4
}
fc --> UC4
g --> UC1
g --> UC2
g --> UC3
@enduml
```



You can use `rectangle` to change the display of the package.

```
@startuml
left to right direction
actor "Food Critic" as fc
rectangle Restaurant {
  usecase "Eat Food" as UC1
  usecase "Pay for Food" as UC2
  usecase "Drink" as UC3
}
fc --> UC1
fc --> UC2
fc --> UC3
@enduml
```



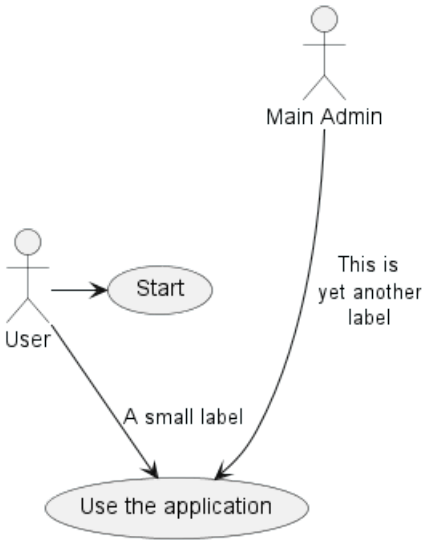
2.6 Einfaches Beispiel

Um Akteure und Anwendungsfälle miteinander zu verbinden wird der Pfeil `-->` verwendet

Je mehr Bindestriche `-` der Pfeil enthält, desto länger wird der Pfeil. Mit einem Doppelpunkt `:` kann dem Pfeil eine Beschreibung hinzugefügt werden.

In diesem Beispiel kann man sehen, wie ein vorher nicht deklarierter *User* automatisch als Akteur deklariert wird.

```
@startuml

User -> (Start)
User --> (Use the application) : A small label

:Main Admin: ---> (Use the application) : This is\nyet another\nlabel

@enduml
```

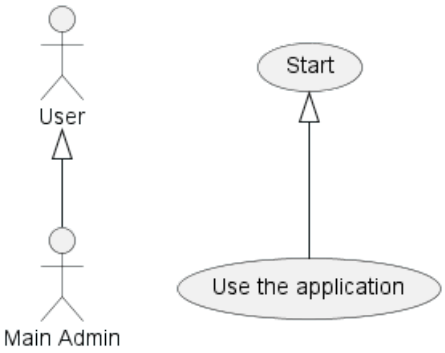


2.7 Erweiterungen / Generalisierungen

Wenn ein Akteur oder Anwendungsfall einen anderen erweitert, dann kann dies mit dem Symbol `<|--`.

```
@startuml
:Main Admin: as Admin
(Use the application) as (Use)

User <|-- Admin
(Start) <|-- (Use)
```

```
@enduml
```

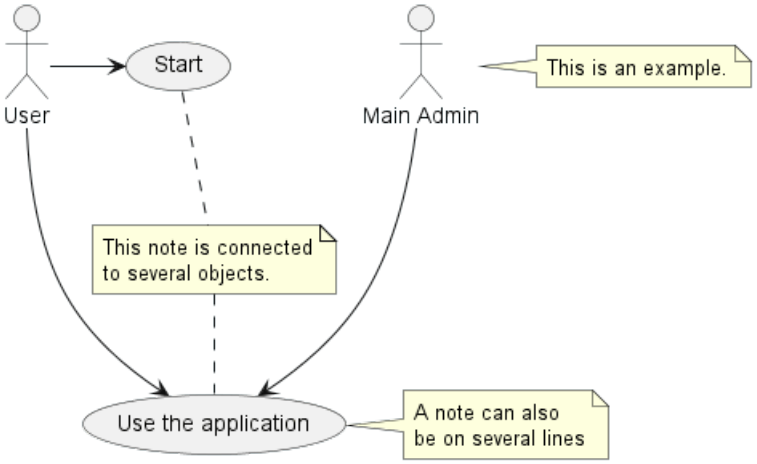


2.8 Verwenden von Notizen

Mit den `note left of` , `note right of` , `note top of` , `note bottom of` Schlüsselwörtern kann man die Position der Notiz relativ zum Objekt festlegen.

Eine Notiz kann aber auch nur mit dem `note` Schlüsselwort erstellt werden und dann mit dem `..` Symbol den Objekten zugeordnet werden.

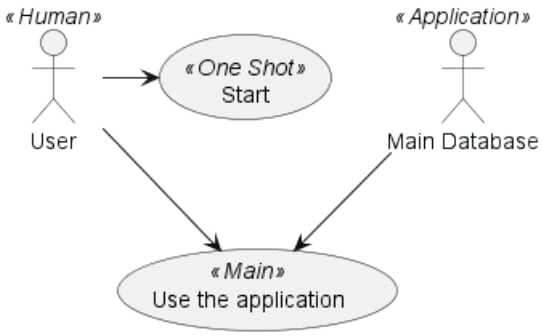
```
@startuml
:Main Admin: as Admin
(Use the application) as (Use)

User -> (Start)
User --> (Use)

Admin ---> (Use)

note right of Admin : This is an example.

note right of (Use)
  A note can also
  be on several lines
end note

note "This note is connected\nto several objects." as N2
(Start) .. N2
N2 .. (Use)
@enduml
```



2.9 Stereotypen

Stereotypen könne während der Erstellung der Akteure und der Anwendungsfälle mit den << und >> Symbolen hinzugefügt werden .

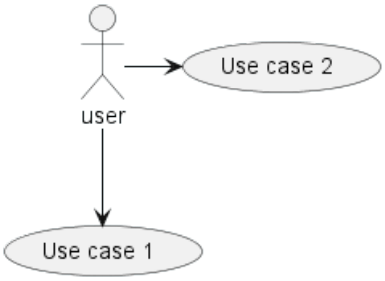
```
@startuml
User << Human >>
:Main Database: as MySql << Application >>
(Start) << One Shot >>
(Use the application) as (Use) << Main >>

User -> (Start)
User --> (Use)

MySql --> (Use)

@enduml
```



2.10 Ändern der Pfeilrichtungen

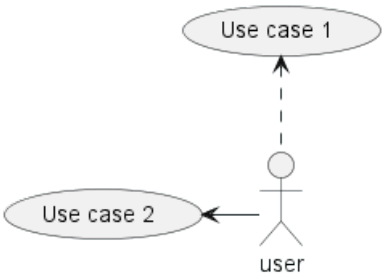
Normalerweise haben die Verbindungen zwischen den Klassen zwei Striche -- und werden senkrecht gezeichnet. Es ist aber möglich waagerechte Verbindungen zu erstellen in dem man einen einzelnen Strich (oder Punkt) eingibt:

```
@startuml
:user: --> (Use case 1)
:user: -> (Use case 2)
@enduml
```



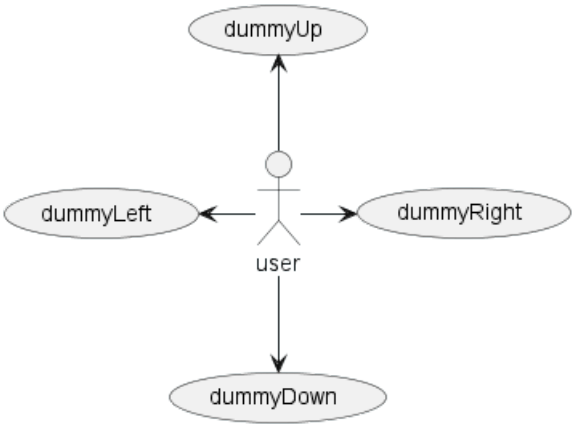
Sie können auch die Richtung der Verlinkung umkehren:

```
@startuml
(Use case 1) <.. :user:
(Use case 2) <- :user:
@enduml
```



Die Richtung der Pfeile kann man durch das hinzufügen der `left`, `right`, `up` oder `down` Schlüsselworte im Pfeil bestimmen:

```
@startuml
:user: -left-> (dummyLeft)
:user: -right-> (dummyRight)
:user: -up-> (dummyUp)
:user: -down-> (dummyDown)
@enduml
```



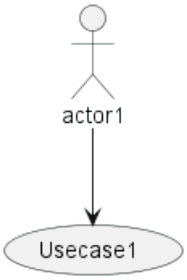
Man kann die Pfeile verkürzen, wenn man nur den ersten Buchstaben für die Richtung verwendet (zum Beispiel, `-d-` anstelle von `-down-`) oder man nimmt die ersten beiden Buchstaben (`-do-`).

Diese Möglichkeit sollte aber nicht missbraucht werden: *GraphViz* liefert normalerweise recht gute Ergebnisse, ohne das manuell eingeriffen werden muss.

2.11 Aufteilen von Diagrammen auf mehrere Seiten

Mit dem Befehl `newpage` kann das Diagramm auf mehrere Seiten oder Bilder verteilt werden.

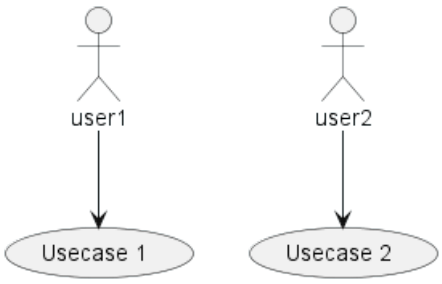
```
@startuml
:actor1: --> (Usecase1)
newpage
:actor2: --> (Usecase2)
@enduml
```



2.12 Verändern der Richtung in der die Objekte angeordnet werden

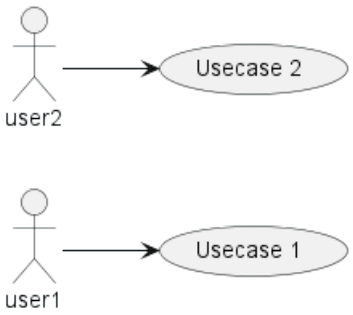
Das voreingestellte verhalten bei der Erstellung des Diagramms ist von oben nach unten.

```
@startuml
'default
top to bottom direction
user1 --> (Usecase 1)
user2 --> (Usecase 2)

@enduml
```



Dies lässt sich aber durch die Verwendung des `left to right direction` Befehls verändern. Oft ist das Ergebnis mit dieser Einstellung besser.

```
@startuml

left to right direction
user1 --> (Usecase 1)
user2 --> (Usecase 2)

@enduml
```



2.13 Der Skinparam-Befehl

Mit dem skinparam Befehl kann die Farbe und die Schriftart der Zeichnung verändert werden.

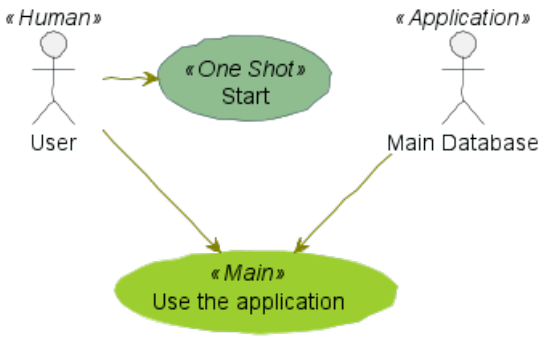
Sie können den Befehl auf die folgenden Arten verwenden:

- Wie alle ander Befehle In einer Diagrammdefinition,
- in einer Include-Datei,
- In einer Konfigurationsdatei, die durch die Kommandozeile oder den ANT-Task übergeben wird.

Man kann bestimmte Farben und Schriften für Klassen von Akteuren und Anwendungsfälle festlegen.

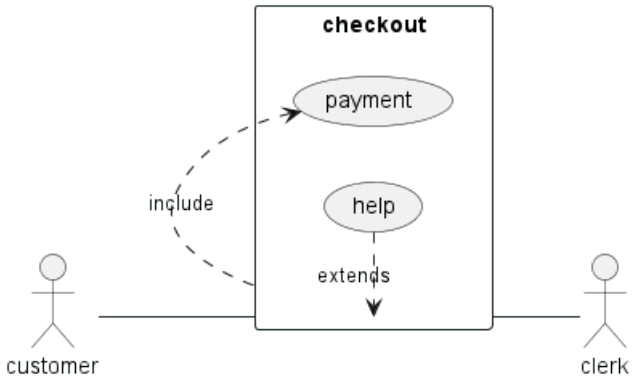
```
@startuml
skinparam handwritten true

skinparam usecase {
BackgroundColor DarkSeaGreen
BorderColor DarkSlateGray
```

```
BackgroundColor<< Main >> YellowGreen
BorderColor<< Main >> YellowGreen

ArrowColor Olive
ActorBorderColor black
ActorFontName Courier

ActorBackgroundColor<< Human >> Gold
}

User << Human >>
:Main Database: as MySql << Application >>
(Start) << One Shot >>
(Use the application) as (Use) << Main >>

User -> (Start)
User --> (Use)

MySql --> (Use)

@enduml
```



2.14 Vollständiges Beispiel

```
@startuml
left to right direction
skinparam packageStyle rectangle
actor customer
actor clerk
rectangle checkout {
  customer -- (checkout)
  (checkout) .> (payment) : include
  (help) .> (checkout) : extends
  (checkout) -- clerk
}
@enduml
```

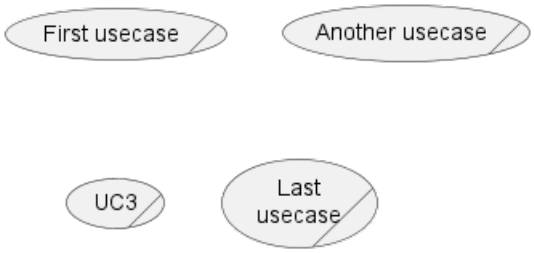


2.15 Business Use Case

You can add / to make Business Use Case.

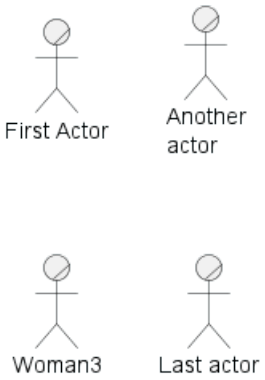
2.15.1 Business Usecase

```
@startuml

(First usecase)/
(Another usecase)/ as (UC2)
usecase/ UC3
usecase/ (Last\nusecase) as UC4

@enduml
```



2.15.2 Business Actor

```
@startuml

:First Actor:/
:Another\nactor:/ as Man2
actor/ Woman3
actor/ :Last actor: as Person1

@enduml
```



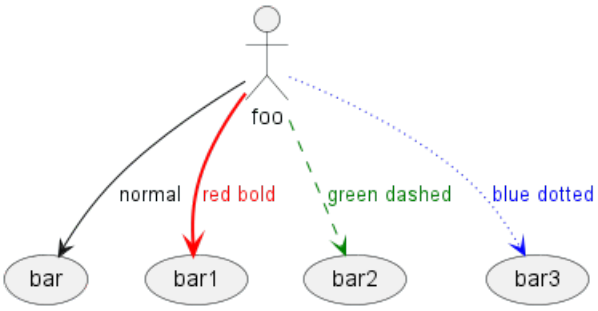
[Ref. QA-12179]

2.16 Change arrow color and style (inline style)

You can change the color or style of individual arrows using the inline following notation:

- `#color;line.[bold|dashed|dotted];text:color`

```
@startuml
actor foo
foo --> (bar) : normal
foo --> (bar1) #line:red;line.bold;text:red  : red bold
foo --> (bar2) #green;line.dashed;text:green : green dashed
foo --> (bar3) #blue;line.dotted;text:blue   : blue dotted
@enduml
```



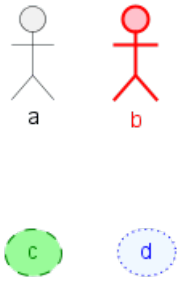
[Ref. QA-3770 and QA-3816] [See similar feature on deployment-diagram or class diagram]

2.17 Change element color and style (inline style)

You can change the color or style of individual element using the following notation:

- `#[color|back:color];line:color;line.[bold|dashed|dotted];text:color`

```
@startuml
actor a
actor b #pink;line:red;line.bold;text:red
usecase c #palegreen;line:green;line.dashed;text:green
usecase d #aliceblue;line:blue;line.dotted;text:blue
@enduml
```

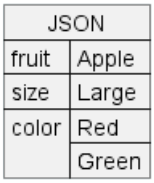


[Ref. QA-5340 and adapted from QA-6852]

2.18 Display JSON Data on Usecase diagram

2.18.1 Simple example

```
@startuml
allowmixing

actor     Actor
usecase   Usecase

json JSON {
   "fruit":"Apple",
   "size":"Large",
   "color": ["Red", "Green"]
}
@enduml
```



[Ref. QA-15481]

For another example, see on JSON page.

3 Klassendiagramm

Klassendiagramme werden mit einer Syntax entworfen, die derjenigen ähnelt, die traditionell in Programmiersprachen verwendet wird. Diese Ähnlichkeit fördert eine vertraute Umgebung für Entwickler und erleichtert so die Erstellung von Diagrammen.

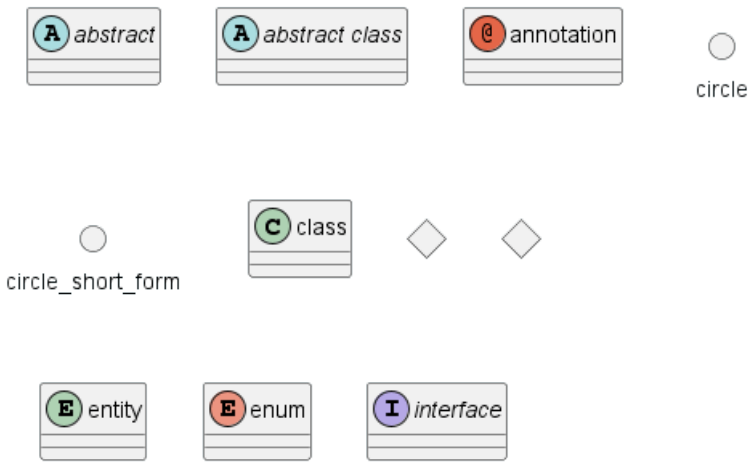
Dieser Designansatz ist nicht nur prägnant, sondern ermöglicht auch die Erstellung von Darstellungen, die sowohl prägnant als auch aussagekräftig sind. Darüber hinaus ermöglicht er die Darstellung von Beziehungen zwischen Klassen durch eine Syntax, die an die von Sequenzdiagrammen angelehnt ist, und ebnet so den Weg für eine flüssige und aufschlussreiche Darstellung von Klasseninteraktionen.

Über strukturelle und relationale Darstellungen hinaus unterstützt die Klassendiagrammsyntax weitere Anreicherungen wie das Einfügen von Notizen und die Anwendung von Farben, wodurch Benutzer in die Lage versetzt werden, Diagramme zu erstellen, die sowohl informativ als auch visuell ansprechend sind.

Sie können mehr über einige der gängigen Befehle in PlantUML erfahren, um Ihre Diagrammerstellung zu verbessern.

3.1 Elemente deklarieren

```
@startuml
abstract        abstract
abstract class  "abstract class"
annotation      annotation
circle          circle
()              circle_short_form
class           class
diamond         diamond
<>              diamond_short_form
entity          entity
enum            enum
interface       interface
@enduml
```



[Ref. for `protocol` and `struct`: GH-1028]

[Ref. for `protocol` and `struct`: GH-1028, for `exception`: QA-16258]

3.2 Beziehungen zwischen Klassen

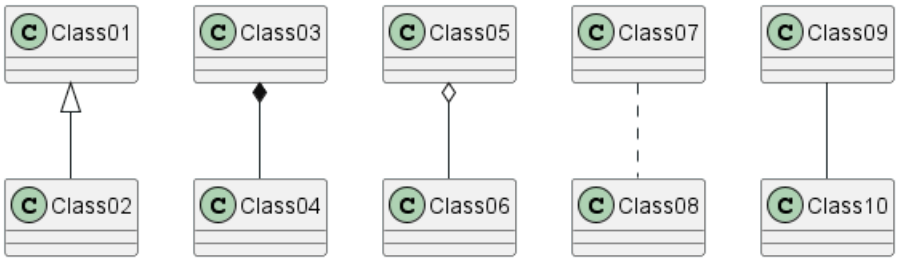
Beziehungen zwischen Klassen werden mit den folgenden Symbolen gekennzeichnet:

Type	Symbol	Drawing
Extension	`<|--`	
Composition	`*--`	
Aggregation	`o--`	

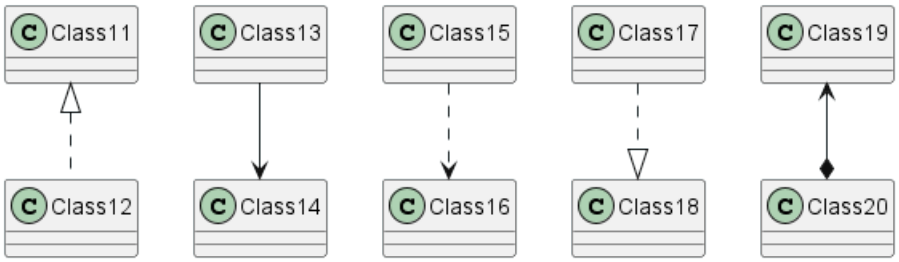
Es ist möglich `--` durch `..` zu ersetzen, um eine gestrichelte Linie zu erhalten.

Wenn man diese Regeln kennt, ist es möglich, die folgenden Zeichnungen zu zeichnen:

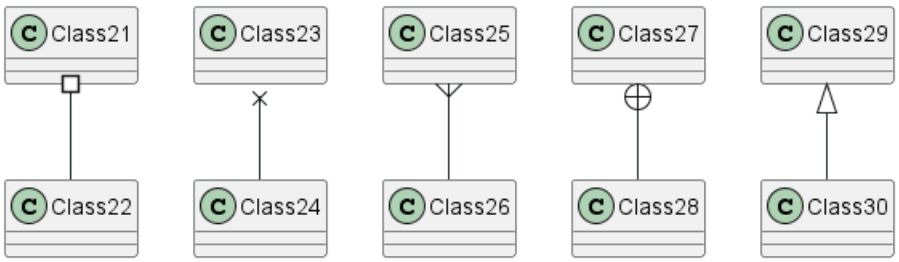
```
@startuml
Class01 <|-- Class02
Class03 *-- Class04
Class05 o-- Class06
Class07 .. Class08
Class09 -- Class10
@enduml
```




```
@startuml
Class11 <|.. Class12
Class13 --> Class14
Class15 ..> Class16
Class17 ..|> Class18
Class19 <--* Class20
@enduml
```




```
@startuml
Class21 #-- Class22
Class23 x-- Class24
Class25 }-- Class26
Class27 +-- Class28
Class29 ^-- Class30
@enduml
```

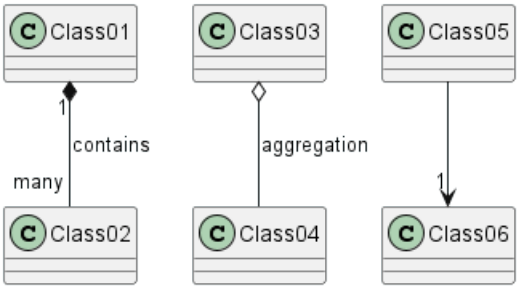


3.3 Beschriften von Beziehungen

Beziehungen können beschriftet werden, durch das Anhängen eines Doppelpunktes `:` gefolgt von dem Beschriftungstext.

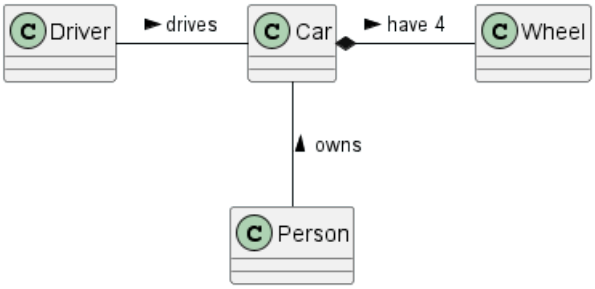
Um Kardinalität anzuzeigen, verwendet man doppelte Anführungszeichen `""` auf jeder Seite der Beziehung.

```
@startuml

Class01 "1" *-- "many" Class02 : contains

Class03 o-- Class04 : aggregation

Class05 --> "1" Class06

@enduml
```



Um zu zeigen, in welche Richtung die Beziehung wirkt, können an die Beschriftung zusätzliche Pfeilspitzen angehängt werden, indem man vor die Beschriftung `<` oder nach der Beschriftung `>` verwendet.

```
@startuml
class Car

Driver - Car : drives >
Car *- Wheel : have 4 >
Car -- Person : < owns

@enduml
```

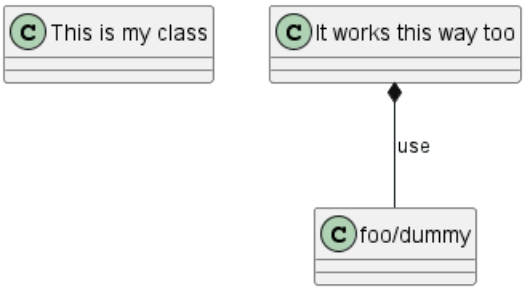


3.4 Verwendung von Sonderzeichen

Wenn sie in dem Name Ihrer Klasse (oder des Enums, oder der Schnittstelle) Zeichen verwenden wollen, dann gibt es die folgenden Möglichkeiten:

- Verwenden Sie das `as` Schlüsselwort in der Definition
- Schließen Sie den Namen in Hochommas `""` ein

```
@startuml
class "This is my class" as class1
class class2 as "It works this way too"

class2 *-- "foo/dummy" : use
@enduml
```



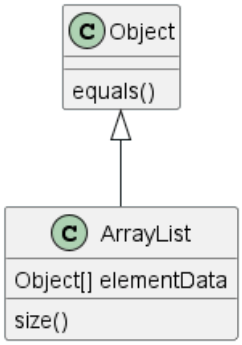
Also note that names starting with `$` are valid, but to assign an alias to such element the name must be put between quotes `""`.

3.5 Methoden hinzufügen

Um Feldern und Methoden zu einer Klasse hinzuzufügen, wird der Doppelpunkt `:` gefolgt von dem Namen des Feldes oder der Methode verwendet.

Das System erkennt anhand der Klammern, ob es sich um eine Methode oder um ein Feld handelt.

```
@startuml
Object <|-- ArrayList

Object : equals()
ArrayList : Object[] elementData
ArrayList : size()

@enduml
```



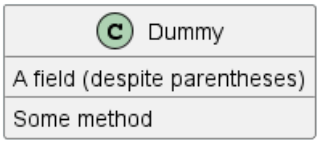
Es ist möglich in Klammern, Feldern und Methoden mit `{}` zu gruppieren

Die Syntax ist sehr flexibel bezüglich der Reihenfolge der Typen und Namen.

```
@startuml
class Dummy {
  String data
  void methods()
}

class Flight {
   flightNumber : Integer
   departureTime : Date
}
@enduml
```

Sie können die Modifier `{field}` und `{method}` verwenden, um das Standardverhalten des Parsers bei Feldern und Methoden zu übersteuern.

```
@startuml
class Dummy {
  {field} A field (despite parentheses)
  {method} Some method
}

@enduml
```

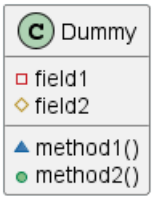


3.6 Sichtbarkeit festlegen

Beim Definieren von Methoden und Feldern kann die Sichtbarkeit mit einem der folgenden Zeichen festgelegt werden:

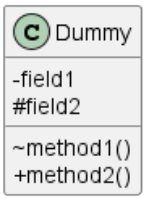
Character	Icon for field	Icon for method	Visibility
-	□	■	private
#	◇	◆	protected
~	△	▲	package private
+	○	●	public

```
@startuml

class Dummy {
 -field1
 #field2
 ~method1()
 +method2()
}

@enduml
```



Mit dem `skinparam classAttributeIconSize 0` Befehl kann dieses Verhalten ausgeschaltet werden :

```
@startuml
skinparam classAttributeIconSize 0
class Dummy {
 -field1
 #field2
 ~method1()
 +method2()
}

@enduml
```

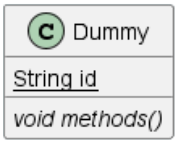


3.7 Abstract und Static

Sie können statische oder abstrakte methoden und statische Attribute durch benutzen des `{static}` oder `{abstract}` Modifikators definieren.

Diese Modifikatoren können am Anfang oder am Ende der Zeile benutzt werden. Es kann auch `{classifier}` statt `{static}` benutzt werden.

```
@startuml
class Dummy {
  {static} String id
  {abstract} void methods()
}
@enduml
```



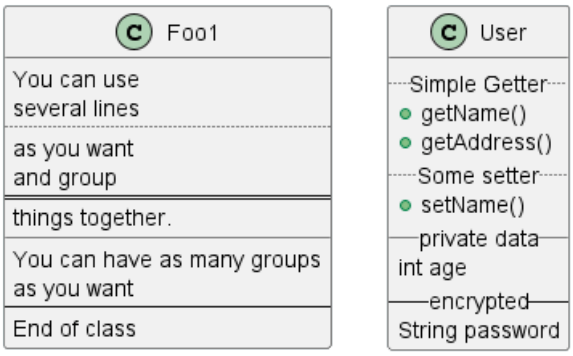
3.8 Der Klassenrumpf für Fortgeschrittene

Standardmäßig werden die Methoden und Felder im Klassenrumpf automatisch von PlantUML gruppiert. Mit Hilfe von Trennzeichen können Felder und Methoden aber auch selber geordnet werden. Folgende Trennzeichen sind möglich: `--` (einfache durchzogene Linie), `..` (einfache unterbrochene Linie), `==` (doppelte durchzogene Linie, `__` (dicke durchzogene Linie).

Es können auch Titel innerhalb des Trennzeichen angegeben werden:

```
@startuml
class Foo1 {
  You can use
  several lines
  ..
  as you want
  and group
  ==
  things together.
  __
  You can have as many groups
  as you want
  --
  End of class
}

class User {
  .. Simple Getter ..
  + getName()
  + getAddress()
  .. Some setter ..
  + setName()
  __ private data __
```

```
  int age
  -- encrypted --
  String password
}

@enduml
```



3.9 Notizen und Stereotypen

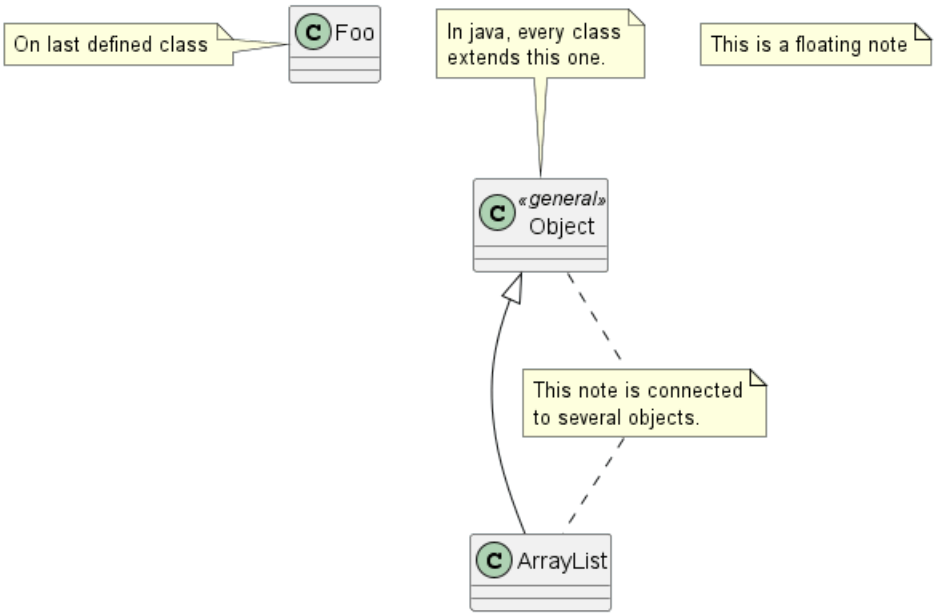
Stereotypen werden mit dem Schlüsselwort `class` oder mit den Symbolen `<<` (doppelte spitze Klammer links) und `>>` (doppelte spitze Klammer rechts) definiert. Zwischen den Klammern wird der Name des Stereotyps angegeben.

Mit den `note left of` , `note right of`, `note top of` , `note bottom of` Schlüsselwörtern kann man Notizen und ihre Position festlegen.

Eine Notiz zur zuletzt definierten Klasse wird mit den Schlüsselwörtern `note left`, `note right`,`note top`, `note bottom` hinzugefügt.

Eine Notiz kann aber auch nur mit dem `note` Schlüsselwort erstellt werden und dann mit dem `..` Symbol den Klassen zugeordnet werden.

```
@startuml
class Object << general >>
Object <|--- ArrayList

note top of Object : In java, every class\nextends this one.

note "This is a floating note" as N1
note "This note is connected\nto several objects." as N2
Object .. N2
N2 .. ArrayList

class Foo
note left: On last defined class

@enduml
```



3.10 Mehr zu Notizen

Es ist auch möglich einige HTML Tags wie (See Creole expression):

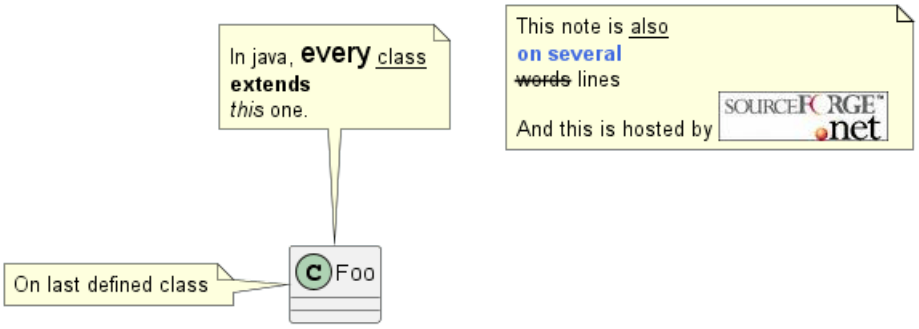
- `<b>`
- `<u>`
- `<i>`
- `<s>`, `<del>`, `<strike>`
- `<font color="#AAAAAA">` or `<font color="colorName">`
- `<color:#AAAAAA>` or `<color:colorName>`
- `<size:nn>` to change font size
- `<img src="file">` or `<img:file>`: the file must be accessible by the filesystem

Es ist auch möglich eine Notiz über mehrere Zeilen zu erstellen.

Eine Notiz bezogen auf die letzte definierte Klasse kann mit `note left`, `note right`, `note top` oder `note bottom` erstellt werden.

```
@startuml

class Foo
note left: On last defined class

note top of Foo
  In java, <size:18>every</size> <u>class</u>
  <b>extends</b>
  <i>this</i> one.
end note

note as N1
  This note is <u>also</u>
  <b><color:royalBlue>on several</color>
  <s>words</s> lines
  And this is hosted by <img:sourceforge.jpg>
end note
```

```
@enduml
```



3.11 Note on field (field, attribute, member) or method

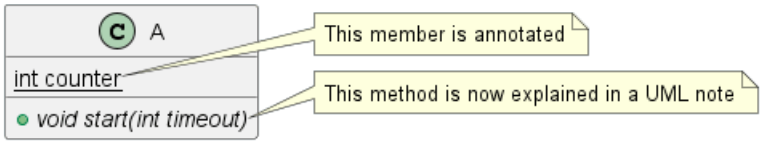
It is possible to add a note on field (field, attribute, member) or on method.

3.11.1 Constraint

- This cannot be used with `top` or `bottom` *(only `left` and `right` are implemented)*
- This cannot be used with namespaceSeparator `::`

3.11.2 Note on field or method

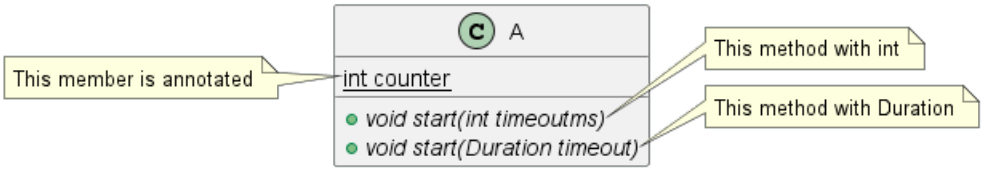
```
@startuml
class A {
{static} int counter
+void {abstract} start(int timeout)
}
note right of A::counter
  This member is annotated
end note
note right of A::start
  This method is now explained in a UML note
end note
@enduml
```



3.11.3 Note on method with the same name

```
@startuml
class A {
{static} int counter
+void {abstract} start(int timeoutms)
+void {abstract} start(Duration timeout)
}
note left of A::counter
  This member is annotated
end note
note right of A::"start(int timeoutms)"
  This method with int
end note
note right of A::"start(Duration timeout)"
  This method with Duration
```

```
end note
@enduml
```



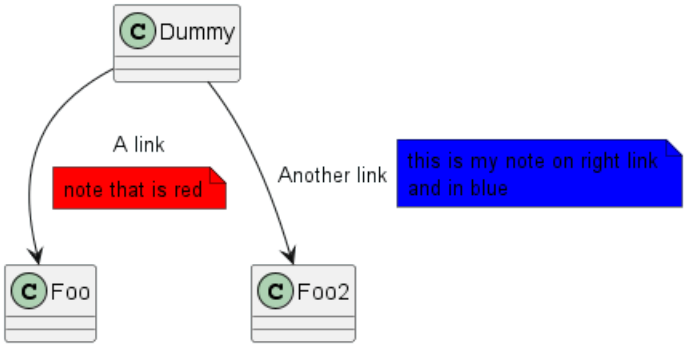
[Ref. QA-3474 and QA-5835]

3.12 Notizen zu Beziehungen

Eine Notiz zu einer Beziehung kann direkt nach der Beziehungsdefinition erfolgen: `note on link`.

Zur relativen Positionierung der Notiz können die Schlüsselwörter `note left on link`, `note right on link`, `note top on link`, `note bottom on link` verwendet werden.

```
@startuml

class Dummy
Dummy --> Foo : A link
note on link #red: note that is red

Dummy --> Foo2 : Another link
note right on link #blue
this is my note on right link
and in blue
end note

@enduml
```



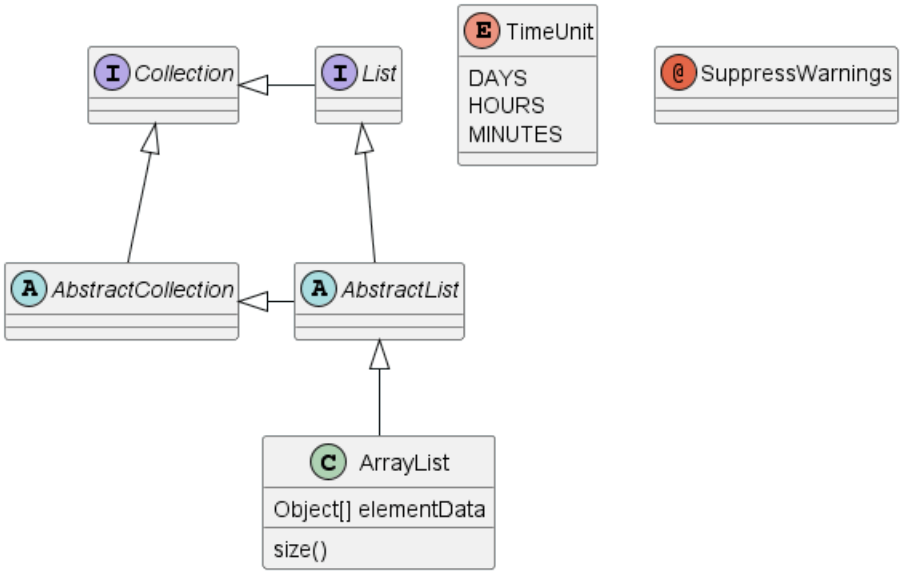
3.13 Abstrakte Klassen und Interfaces

Eine abstrakte Klasse lässt sich über das `abstract` oder das `abstract class` Schlüsselwort definieren. Die Klasse wird dann kursiv gedruckt.

Man kann auch die `interface`, `annotation` und `enum` Schlüsselwörter verwenden.

```
@startuml

abstract class AbstractList
abstract AbstractCollection
interface List
interface Collection

List <|-- AbstractList
Collection <|-- AbstractCollection
```

```
Collection <|- List
AbstractCollection <|- AbstractList
AbstractList <|-- ArrayList

class ArrayList {
  Object[] elementData
  size()
}

enum TimeUnit {
  DAYS
  HOURS
  MINUTES
}

annotation SuppressWarnings

@enduml
```



[Ref. 'Annotation with members' [Issue#458](https://github.com/plantuml/plantuml/issues/458)]

3.14 Verstecken von Attributen, Methoden ...

Die Anzeige einer Klasse kann über das `hide/show` Kommando parametrisiert werden.

Der Basisbefehl ist `hide empty members`. Mit diesem Befehl werden leere Atribute und Methoden ausgeblendet.

Anstelle von `empty members` kann man auch die folgenden Befehle verwenden:

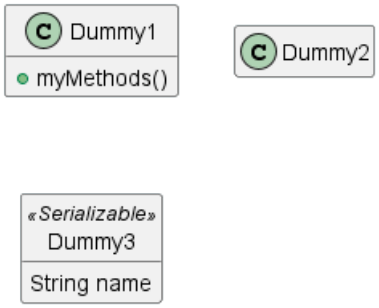
- `empty fields` oder `empty attributes` für leere Felder,
- `empty methods` für leere Methoden,
- `fields` oder `attributes` um Felder auszublenden, auch wenn diese definiert sind,
- `methods` um Methoden auszublenden, auch wenn diese definiert sind,
- `members` um Methoden und Felder auszublenden, auch wenn diese definiert sind,
- `circle` um einen in einen Kreis eingeschlossenen Buchstaben vor dem Klassennamen anzuzeigen,
- `stereotype` um einen Stereotypen anzuzeigen.

Nach dem `hide` oder dem `show` Schlüsselwort kann man auch noch die folgenden Befehle anfügen:

- `class` für alle Klassen,
- `interface` für alle Schnittstellen,
- `enum` für alle Enums,
- `<<foo1>>` für alle Klassen, die mit dem Stereotyp *foo1* ausgezeichnet sind,
- einen namen einer existierenden Klasse.

Es lassen sich mehrere `show/hide` Befehle verketten, um Regeln und ausnahmen festzulegen.

```
@startuml

class Dummy1 {
  +myMethods()
}

class Dummy2 {
  +hiddenMethod()
}

class Dummy3 <<Serializable>> {
String name
}

hide members
hide <<Serializable>> circle
show Dummy1 methods
show <<Serializable>> fields

@enduml
```



3.15 Verstecken von Klassen

Mit den `show/hide` Befehlen können Klassen versteckt werden.

Dies kann hilfreich sein, wenn man eine große !included Datei verwendet und dann einige Klassen nach dem einbinden der Datei verstecken möchte.

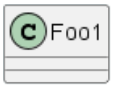
```
@startuml

class Foo1
class Foo2

Foo2 *-- Foo1

hide Foo2

@enduml
```

3.16 Klassen entfernen

Sie können auch den Befehl `remove` verwenden, um Klassen zu entfernen.

Dies kann nützlich sein, wenn Sie eine große !included-Datei definieren, und wenn Sie einige Klassen nach dem einbinden der Datei entfernen möchten.

```
@startuml

class Foo1
class Foo2

Foo2 *-- Foo1

remove Foo2

@enduml
```

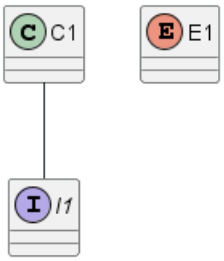


3.17 Hide, Remove or Restore tagged element or wildcard

You can put `$tags` (using `$`) on elements, then remove, hide or restore components either individually or by tags.

By default, all components are displayed:

```
@startuml
class C1 $tag13
enum E1
interface I1 $tag13
C1 -- I1
@enduml
```



But you can:

- `hide $tag13` components:

```
@startuml
class C1 $tag13
enum E1
interface I1 $tag13
```

```
C1 -- I1

hide $tag13
@enduml
```

- or `remove $tag13` components:

```
@startuml
class C1 $tag13
enum E1
interface I1 $tag13
C1 -- I1

remove $tag13
@enduml
```

- or `remove $tag13 and restore $tag1` components:

```
@startuml
class C1 $tag13 $tag1
enum E1
interface I1 $tag13
C1 -- I1

remove $tag13
restore $tag1
@enduml
```

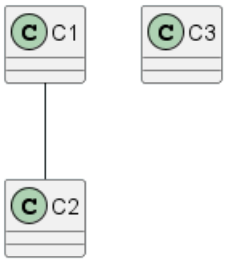
- or `remove * and restore $tag1` components:

```
@startuml
class C1 $tag13 $tag1
enum E1
interface I1 $tag13
C1 -- I1

remove *
restore $tag1
@enduml
```

3.18 Hide or Remove unlinked class

By default, all classes are displayed:

```
@startuml
class C1
class C2
class C3
C1 -- C2
@enduml
```



But you can:

- `hide @unlinked` classes:

```
@startuml
class C1
class C2
class C3
C1 -- C2

hide @unlinked
@enduml
```

- or `remove @unlinked` classes:

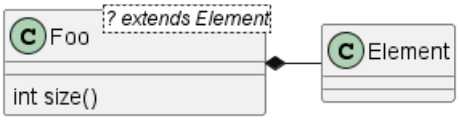
```
@startuml
class C1
class C2
class C3
C1 -- C2

remove @unlinked
@enduml
```

[Adapted from QA-11052]

3.19 Verwenden von Generics

Mit spitzen Klammern (< und >) kann die Verwendung von Generics dargestellt werden.

```
@startuml

class Foo<? extends Element> {
  int size()
}
Foo *- Element

@enduml
```



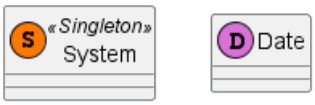
Man kann diese Darstellung mittels des Befehls `skinparam genericDisplay old` ausschalten.

3.20 Besondere Hervorhebungen

Normalerweise werden Klassen, Schnittstellen, Enums und abstrakte Klassen mit einem hervorgehobenen Buchstaben gekennzeichnet (C, I, E or A).

Es ist aber auch möglich eine eigene Hervorhebung zu erstellen wenn man einen Stereotyp definiert. Das wird durch hinzufügen eines einzelnen Buchstabens und einer Farbe so wie im folgenden Beispiel erreicht:

```
@startuml

class System << (S,#FF7700) Singleton >>
class Date << (D,orchid) >>
@enduml
```

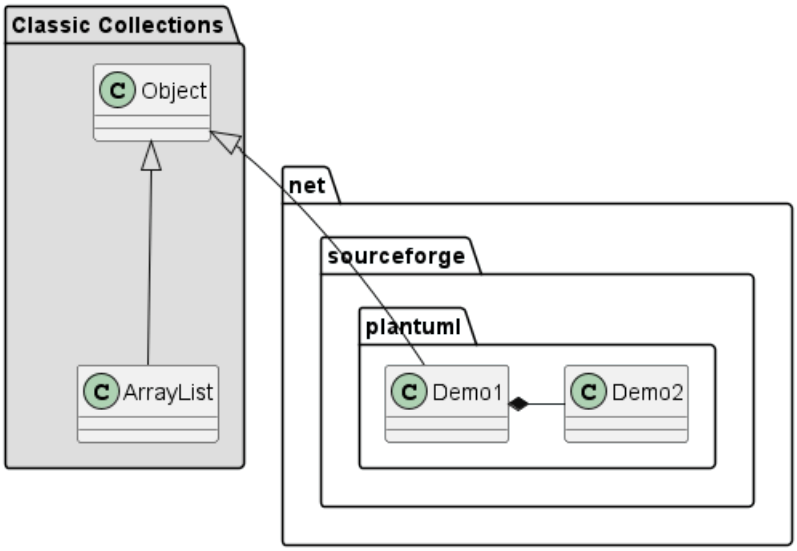


3.21 Pakete

Pakete können über das `package` Schlüsselwort definiert werden. Auf Wunsch kann außerdem die die Hintergrundfarbe für das Paket festgelegt werden. Dies kann durch den Farbnamen oder den HTML Code geschehen.

Es ist möglich, Pakete ineinander zu schachteln.

```
@startuml

package "Classic Collections" #DDDDDD {
  Object <|-- ArrayList
}

package net.sourceforge.plantuml {
  Object <|-- Demo1
  Demo1 *- Demo2
}

@enduml
```



3.22 Paketarten

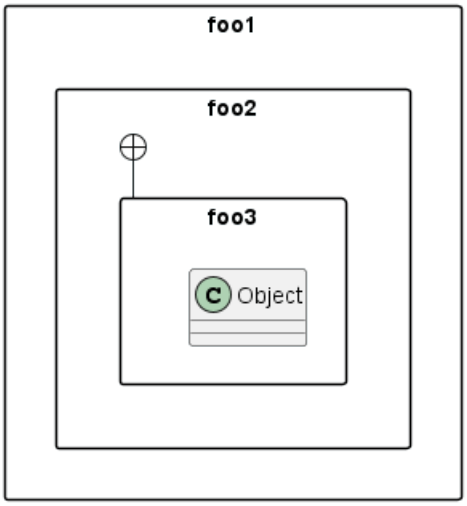
Es stehen verschiedene Arten von Paketen zur Verfügung.

Welches Paket zur Verwendung kommen soll, kann mit dem Befehl `skinparam packageStyle` festgelegt werden. Alternativ kann ein Stereotyp in der Paketdefinition verwendet werden.

```
@startuml
scale 750 width
package foo1 <<Node>> {
  class Class1
}

package foo2 <<Rectangle>> {
  class Class2
}

package foo3 <<Folder>> {
  class Class3
}

package foo4 <<Frame>> {
  class Class4
}

package foo5 <<Cloud>> {
  class Class5
}

package foo6 <<Database>> {
  class Class6
}

@enduml
```

Außerdem ist es möglich, Abhängigkeiten zwischen Paketen zu definieren, wie dies im folgenden Beispiel gezeigt wird:

```
@startuml

skinparam packageStyle rectangle

package foo1.foo2 {
}

package foo1.foo2.foo3 {
  class Object
}

foo1.foo2 +-- foo1.foo2.foo3

@enduml
```



3.23 Namensraum

In Paketen ist der Name einer Klasse der eindeutige Bezeichner der Klasse. Das bedeutet, das man nicht zwei Klassen mit dem gleichen Namen in unterschiedlichen Paketen haben kann.

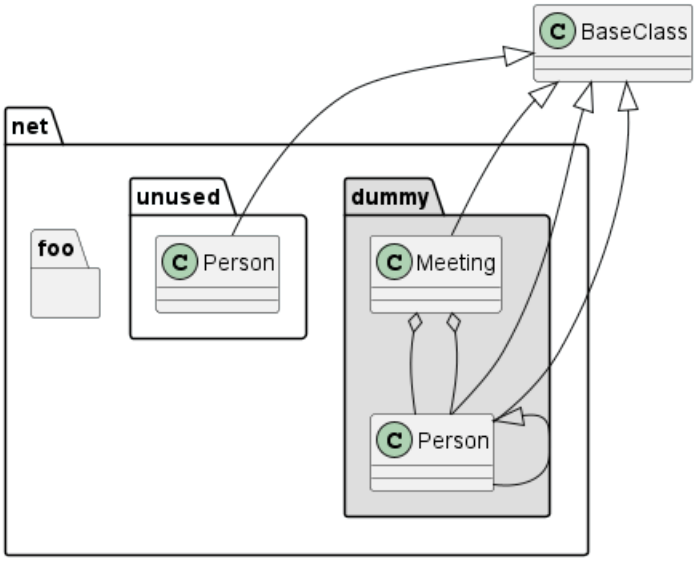
In diesem Fall sollte ein Namensraum anstelle eine Pakets verwendet werden.

Man kann auf eine Klasse aus einem anderen Namensraum verweisen, in dem man den voll qualifizierten Namen der Klasse angibt. Klassen aus dem Standartnamensraum werden mit einem beginnenden Punkt gekennzeichnet.

Beachten Sie, das ein Namensraum nicht explizit festgelegt werden muss: Eine vollqulifizierte Klasse verwendet automatisch den richtigen Namensraum.

```
@startuml

class BaseClass

namespace net.dummy #DDDDDD {
    .BaseClass <|-- Person
    Meeting o-- Person

    .BaseClass <|- Meeting
}

namespace net.foo {
```

```
  net.dummy.Person  <|- Person
  .BaseClass <|-- Person

  net.dummy.Meeting o-- Person
}

BaseClass <|-- net.unused.Person

@enduml
```

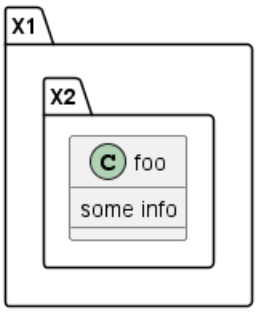


There won't be any difference between namespaces and packages anymore: both keywords are now synonymous.

3.24 Automatische Erzeugung eines Namensraums

Über folgenden Befehl kann ein anderes Trennzeichen (als der Punkt) definiert werden: `set namespaceSeparator ???`.

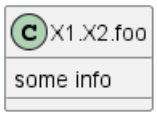
```
@startuml

set namespaceSeparator ::
class X1::X2::foo {
  some info
}

@enduml
```



Die automatische Erzeugung eines Pakets kann mit `set namespaceSeparator none` deaktiviert werden.

```
@startuml
```

```
set namespaceSeparator none
class X1.X2.foo {
  some info
}

@enduml
```

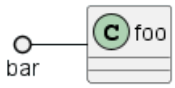


3.25 Lollipop Schnittstellen

Mit der folgenden Syntax kann man Schnittstellen von Klassen definieren:

- `bar ()- foo`
- `bar ()-- foo`
- `foo -() bar`

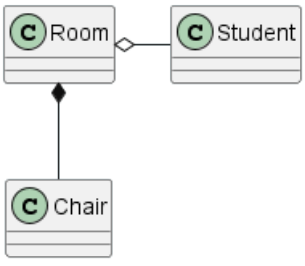
```
@startuml
class foo
bar ()- foo
@enduml
```



3.26 Ändern der Pfeilrichtung

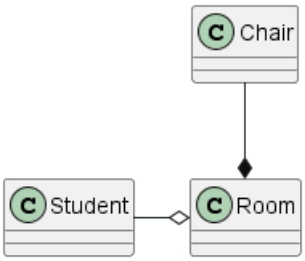
Normalerweise werden Beziehungen zwischen Klassen mit zwei Strichen `--` definiert und die Klassen werden Vertikal angeordnet. Verwendet man nur einen Strich (oder Punkt), dann werden die Klassen horizontal angeordnet so wie im folgenden Beispiel zu sehen ist:

```
@startuml
Room o- Student
Room *-- Chair
@enduml
```



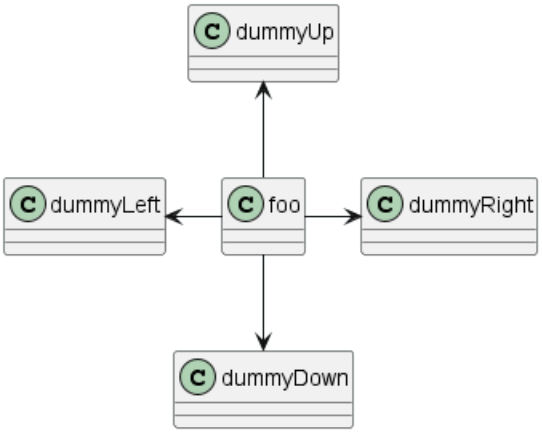
Man kann die Richtung auch durch das Umdrehen der Verbindung ändern:

```
@startuml
Student -o Room
Chair --* Room
@enduml
```



Außerdem ist es möglich, die Richtung der Pfeile durch Hinzufügen der `left`, `right`, `up` oder `down` Schlüsselwörter innerhalb der Pfeile zu verändern:

```
@startuml
foo -left-> dummyLeft
foo -right-> dummyRight
foo -up-> dummyUp
foo -down-> dummyDown
@enduml
```



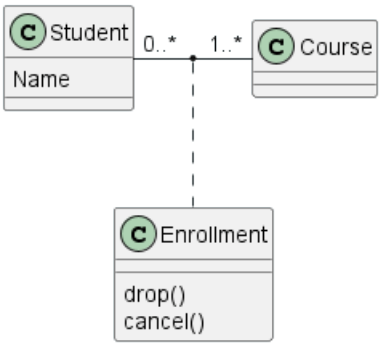
Die Länge der Pfeile kann verkürzt werden, in dem man nur den ersten Buchstaben für die Richtung verwendet (zum Beispiel, `-d-` anstelle von `-down-`) oder die ersten beiden Buchstaben (`-do-`)

Bitte verwenden Sie diese Möglichkeit nur wenn es unbedingt sein muss: *GraphViz* liefert normalerweise recht gute Ergebnisse ohne das manuell eingegriffen werden muss.

3.27 Assoziationsklassen

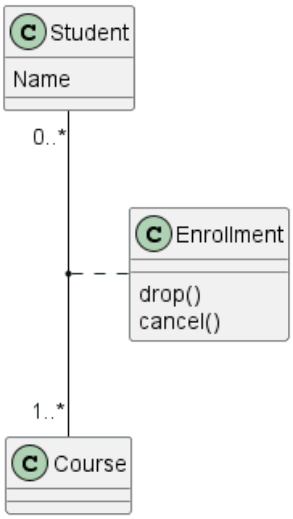
Nach dem man eine Beziehung zwischen zwei Klassen definiert hat, kann man eine *association class* definieren. Hierzu ein Beispiel:

```
@startuml
class Student {
  Name
}
Student "0..*" - "1..*" Course
(Student, Course) .. Enrollment

class Enrollment {
  drop()
  cancel()
}
@enduml
```



Die Richtung lässt ich aber auch ändern:

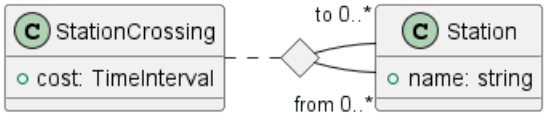
```
@startuml
class Student {
  Name
}
Student "0..*" -- "1..*" Course
(Student, Course) . Enrollment

class Enrollment {
  drop()
  cancel()
}
@enduml
```



3.28 Assoziation in derselben Klasse

```
@startuml
class Station {
    +name: string
}

class StationCrossing {
    +cost: TimeInterval
}

<> diamond

StationCrossing . diamond
diamond - "from 0..*" Station
```

```
diamond - "to 0..* " Station
@enduml
```



[Ref. Inkubation: Assoziationen]

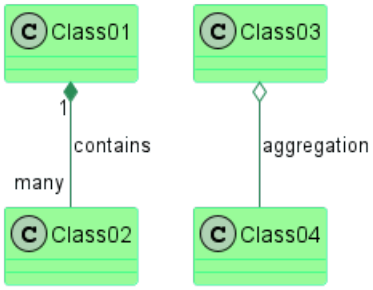
3.29 Der Skinparam-Befehl

Mit dem skinparam Befehl kann die Farbe und die Schriftart der Zeichnung verändert werden.

Sie können den Befehl auf die folgenden Arten verwenden:

- Wie alle ander Befehle In einer Diagrammdefinition,
- in einer Include-Datei,
- In einer Konfigurationsdatei, die durch die Kommandozeile oder den ANT-Task übergeben wird.

```
@startuml

skinparam class {
BackgroundColor PaleGreen
ArrowColor SeaGreen
BorderColor SpringGreen
}
skinparam stereotypeCBackgroundColor YellowGreen

Class01 "1" *-- "many" Class02 : contains

Class03 o-- Class04 : aggregation

@enduml
```

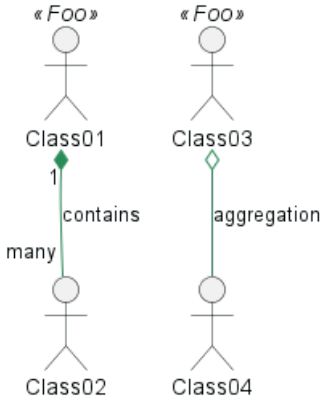


3.30 Das Aussehen von Stereotypen verändern

Es ist möglich die Farbe und die Schriftart der Klassen zu verändern, die mit einem Stereotypen ausgezeichnet sind.

```
@startuml

skinparam class {
BackgroundColor PaleGreen
ArrowColor SeaGreen
BorderColor SpringGreen
BackgroundColor<<Foo>> Wheat
BorderColor<<Foo>> Tomato
}
skinparam stereotypeCBackgroundColor YellowGreen
```

```
skinparam stereotypeCBackgroundColor<< Foo >> DimGray

Class01 <<Foo>>
Class03 <<Foo>>
Class01 "1" *-- "many" Class02 : contains

Class03 o-- Class04 : aggregation

@enduml
```



3.31 Farbverlauf

Mit der # Notation können individuelle Farben für Klassen oder Notizen definiert werden.

Es kann entweder der Standardname der Farbe oder der RGB Code verwendet werden.

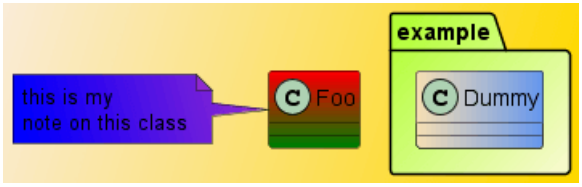
Für den Hintergrund kann ebenfalls ein Farbverlauf verwendet werden: Zwei Farbnamen getrennt durch:

- |,
- /,
- \,
- oder -

abhängig von der Richtung des Verlaufs.

So könnte dies zum Beispiel aussehen:

```
@startuml

skinparam backgroundcolor AntiqueWhite/Gold
skinparam classBackgroundColor Wheat|CornflowerBlue

class Foo #red-green
note left of Foo #blue\9932CC
  this is my
  note on this class
end note

package example #GreenYellow/LightGoldenRodYellow {
  class Dummy
}

@enduml
```



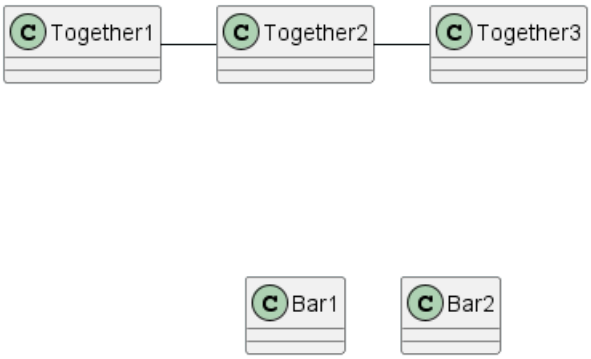
3.32 Hilfe beim Layout

Manchmal ist das vorgegebene Layout nicht optimal.

Sie können das `together` Schlüsselwort benutzen, um der Layout-Engine die Anweisung zu geben einige Klassen zu gruppieren (ähnlich einem `package`).

Mit `hidden` Links kann man auch ein Layout erzwingen.

```
@startuml

class Bar1
class Bar2
together {
  class Together1
  class Together2
  class Together3
}
Together1 - Together2
Together2 - Together3
Together2 -[hidden]--> Bar1
Bar1 -[hidden]> Bar2


@enduml
```



3.33 Große Dateien aufteilen

Manchmal erhält man sehr große Bilddateien.Mit dem `page (hpages)x(vpages)` Befehl kann das erzeugte Bildauf mehrere Dateien verteilt werden:

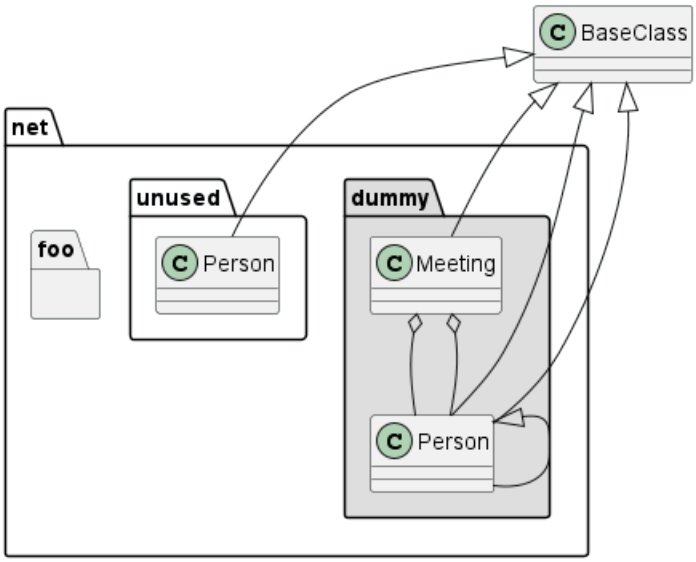
Mit dem `page (hpages)x(vpages)` Befehl kann das erzeugte Bild auf mehrere Dateien aufgeteilt werden:

`hpages` gibt die Anzahl von horizontalen Seiten an, und `vpages` gibt die Anzahl von vertikalen Seiten an.

Die Verwendung von `skinparam` Definitionen, ermöglicht die Darstellung von Außenrahmen für mehrseitige Bilder. (Siehe nachfolgendes Beispiel)

```
@startuml
' Split into 4 pages
page 2x2
skinparam pageMargin 10
skinparam pageExternalColor gray
```

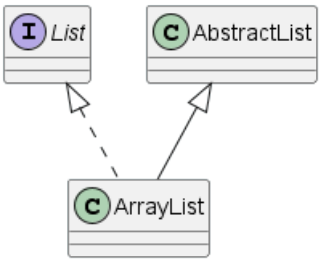
```
skinparam pageBorderColor black

class BaseClass

namespace net.dummy #DDDDDD {
    .BaseClass <|-- Person
    Meeting o-- Person

    .BaseClass <|- Meeting

}

namespace net.foo {
  net.dummy.Person  <|- Person
  .BaseClass <|-- Person

  net.dummy.Meeting o-- Person
}

BaseClass <|-- net.unused.Person
@enduml
```



3.34 Extends und Implements

Es ist auch möglich, die Schlüsselwörter `extends` und `implements` zu verwenden.

```
@startuml
class ArrayList implements List
class ArrayList extends AbstractList
@enduml
```



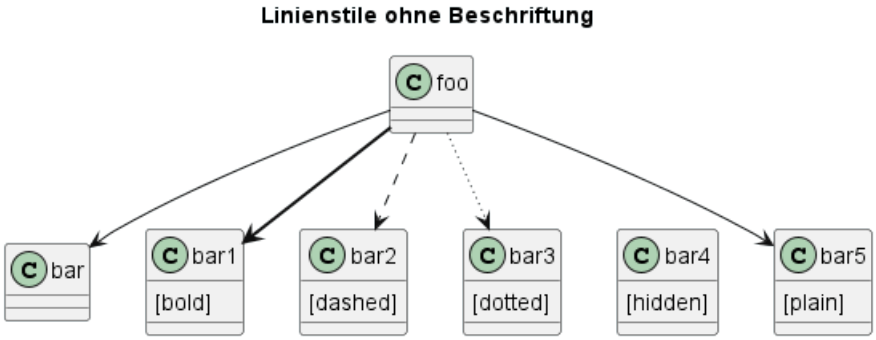
3.35 Design Möglichkeiten für Beziehungen (Verknüpfungen oder Pfeile)

3.35.1 Linienstil

Es ist möglich einen expliziten Stil für Beziehungen (Verknüpfungen oder Pfeile) zu verwenden `bold`, `dashed`, `dotted`, `hidden` oder `plain` :

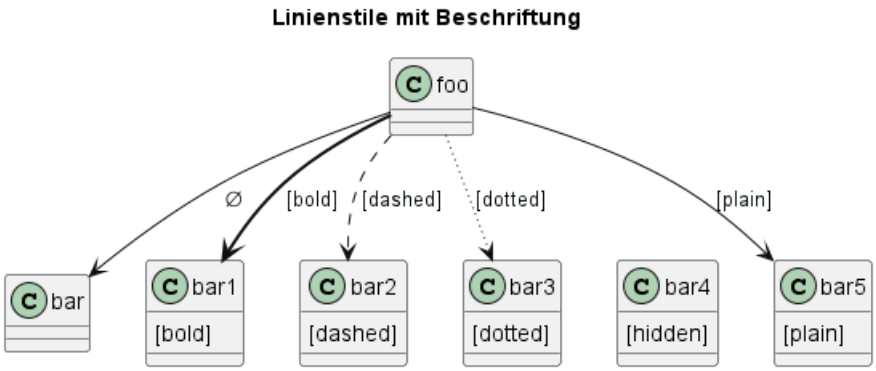
- ohne Label

```
@startuml
title Linienstile ohne Beschriftung
class foo
class bar
bar1 : [bold]
bar2 : [dashed]
bar3 : [dotted]
bar4 : [hidden]
bar5 : [plain]

foo --> bar
foo -[bold]-> bar1
foo -[dashed]-> bar2
foo -[dotted]-> bar3
foo -[hidden]-> bar4
foo -[plain]-> bar5
@enduml
```



- mit Beschriftung

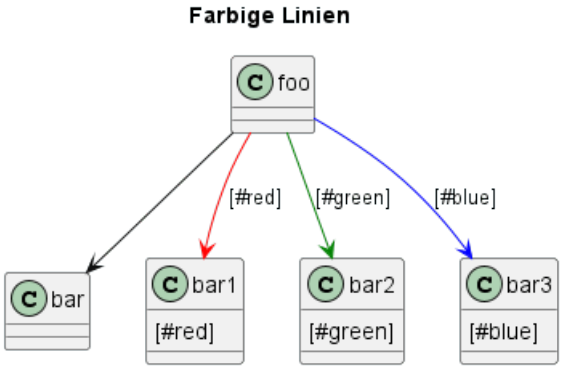
```
@startuml
title Linienstile mit Beschriftung
class foo
class bar
bar1 : [bold]
bar2 : [dashed]
bar3 : [dotted]
bar4 : [hidden]
bar5 : [plain]

foo --> bar          :
foo -[bold]-> bar1   : [bold]
foo -[dashed]-> bar2 : [dashed]
foo -[dotted]-> bar3 : [dotted]
foo -[hidden]-> bar4 : [hidden]
foo -[plain]-> bar5  : [plain]

@enduml
```



[Angepasst von QA-4181]

3.35.2 Linienfarbe

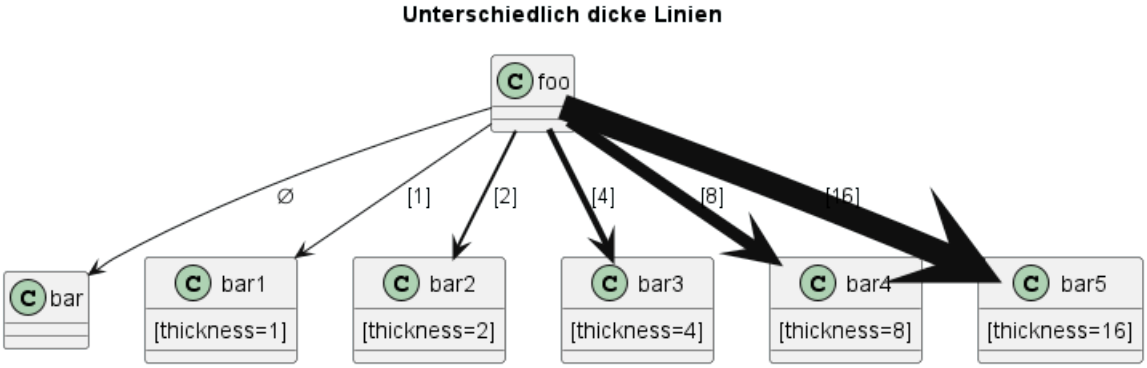
```
@startuml
title Farbige Linien
class foo
class bar
bar1 : [#red]
bar2 : [#green]
bar3 : [#blue]

foo --> bar
foo -[#red]-> bar1     : [#red]
foo -[#green]-> bar2   : [#green]
foo -[#blue]-> bar3    : [#blue]
'foo -[#blue;#yellow;#green]-> bar4
@enduml
```



3.35.3 Linienstärke

```
@startuml
title Unterschiedlich dicke Linien
class foo
class bar
bar1 : [thickness=1]
bar2 : [thickness=2]
bar3 : [thickness=4]
bar4 : [thickness=8]
bar5 : [thickness=16]

foo --> bar                 :
foo -[thickness=1]-> bar1   : [1]
```

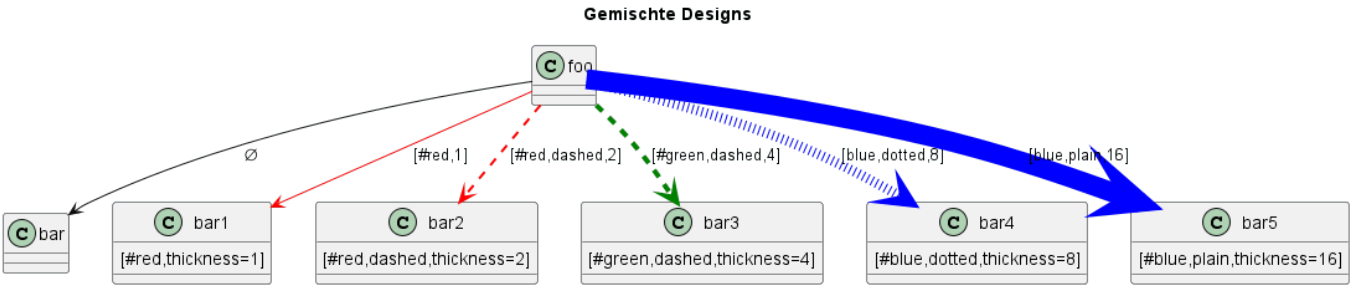
```
foo -[thickness=2]-> bar2   : [2]
foo -[thickness=4]-> bar3   : [4]
foo -[thickness=8]-> bar4   : [8]
foo -[thickness=16]-> bar5  : [16]

@enduml
```



[Ref. QA-4949]

3.35.4 Mischung

```
@startuml
title Gemischte Designs
class foo
class bar
bar1 : [#red,thickness=1]
bar2 : [#red,dashed,thickness=2]
bar3 : [#green,dashed,thickness=4]
bar4 : [#blue,dotted,thickness=8]
bar5 : [#blue,plain,thickness=16]

foo --> bar                                :
foo -[#red,thickness=1]-> bar1             : [#red,1]
foo -[#red,dashed,thickness=2]-> bar2      : [#red,dashed,2]
foo -[#green,dashed,thickness=4]-> bar3    : [#green,dashed,4]
foo -[#blue,dotted,thickness=8]-> bar4     : [blue,dotted,8]
foo -[#blue,plain,thickness=16]-> bar5     : [blue,plain,16]
@enduml
```

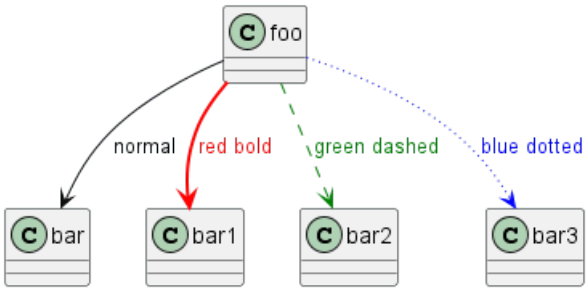


3.36 Ändern der Farbe und des Stils von Beziehungen (Verknüpfungen oder Pfeilen) (Inline-Stil)

Sie können die Farbe oder den Stil einzelner Beziehungen oder Pfeile ändern, indem Sie die folgende Inline-Notation verwenden:

- `#color;line.[bold|dashed|dotted];text:color`

```
@startuml
class foo
foo --> bar : normal
foo --> bar1 #line:red;line.bold;text:red  : red bold
foo --> bar2 #green;line.dashed;text:green : green dashed
foo --> bar3 #blue;line.dotted;text:blue   : blue dotted
@enduml
```



[Siehe ähnliche Funktion bei der Bereitstellung]

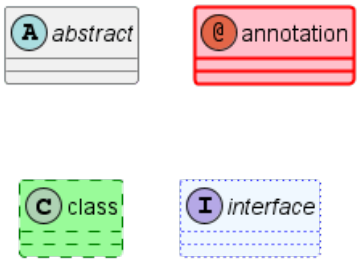
3.37 Ändern der Farbe und des Stils einer Klasse (Inline-Stil)

Sie können die Farbe oder den Stil einer einzelnen Klasse mit den beiden folgenden Notationen ändern:

- `#color ##[style]color`

Zuerst mit der Hintergrundfarbe (`#color`), dann mit dem Zeilenstil und der Zeilenfarbe (`##[style]color`)

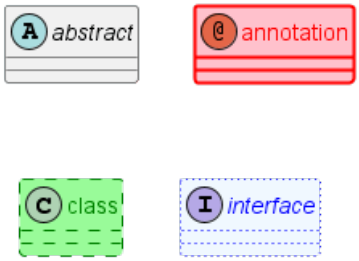
```
@startuml
abstract   abstract
annotation annotation #pink ##[bold]red
class      class      #palegreen ##[dashed]green
interface  interface  #aliceblue ##[dotted]blue
@enduml
```



[Ref. QA-1487]

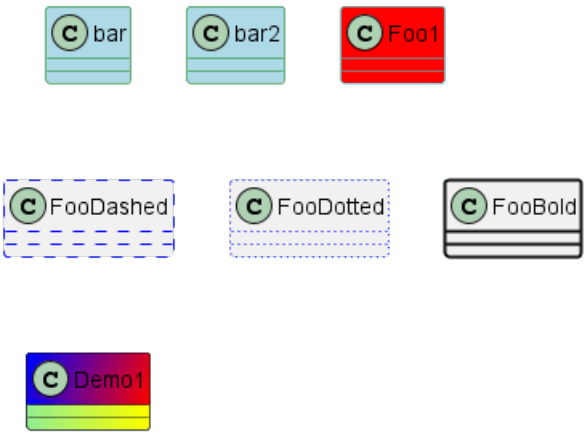
- `#[color|back:color];header:color;line:color;line.[bold|dashed|dotted];text:color`

```
@startuml
abstract   abstract
annotation annotation #pink;line:red;line.bold;text:red
class      class      #palegreen;line:green;line.dashed;text:green
interface  interface  #aliceblue;line:blue;line.dotted;text:blue
@enduml
```



Erstes Originalbeispiel:

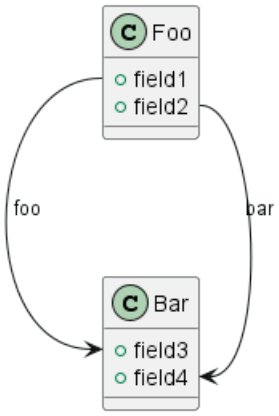
```
@startuml
class bar #line:green;back:lightblue
class bar2 #lightblue;line:green

class Foo1 #back:red;line:00FFFF
class FooDashed #line.dashed:blue
class FooDotted #line.dotted:blue
class FooBold #line.bold
class Demo1 #back:lightgreen|yellow;header:blue/red
@enduml
```



[Ref. QA-3770]

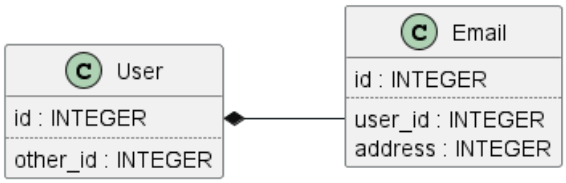
3.38 Pfeile von/zu Klassen Attributen und Methoden

```
@startuml
class Foo {
+ field1
+ field2
}

class Bar {
+ field3
+ field4
}

Foo::field1 --> Bar::field3 : foo
Foo::field2 --> Bar::field4 : bar
@enduml
```



[Ref. QA-3636]

```
@startuml
left to right direction

class User {
  id : INTEGER
  ..
  other_id : INTEGER
}

class Email {
  id : INTEGER
  ..
  user_id : INTEGER
  address : INTEGER
}

User::id *-- Email::user_id
@enduml
```



[Ref. QA-5261]

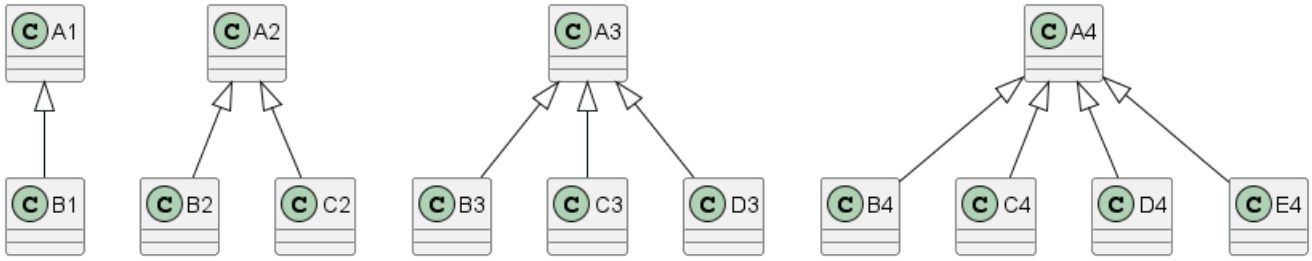
3.39 Gruppierung von Vererbungspfeilspitzen

Sie können alle Pfeilspitzen mit Hilfe von `skinparam groupInheritance` zusammenfassen, mit einem Schwellenwert als Parameter.

3.39.1 GroupInheritance 1 (keine Gruppierung)

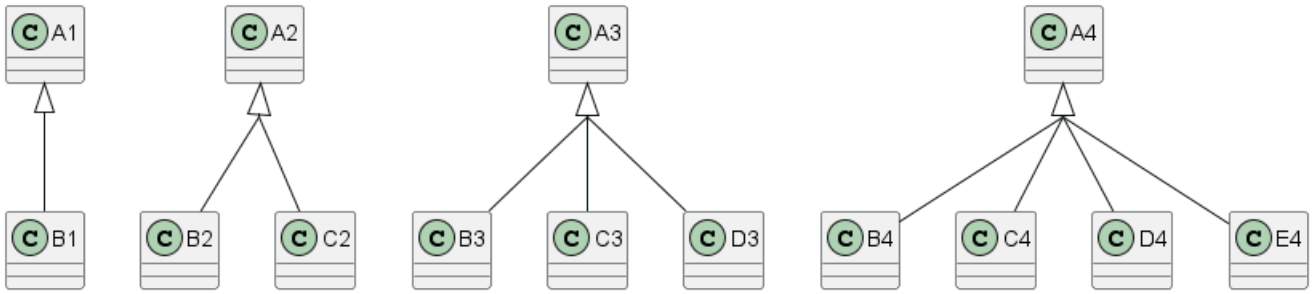
```
@startuml
skinparam groupInheritance 1

A1 <|-- B1

A2 <|-- B2
A2 <|-- C2

A3 <|-- B3
```

```
A3 <|-- C3
A3 <|-- D3

A4 <|-- B4
A4 <|-- C4
A4 <|-- D4
A4 <|-- E4
@enduml
```



3.39.2 Gruppenvererbung 2 (Gruppierung ab 2)

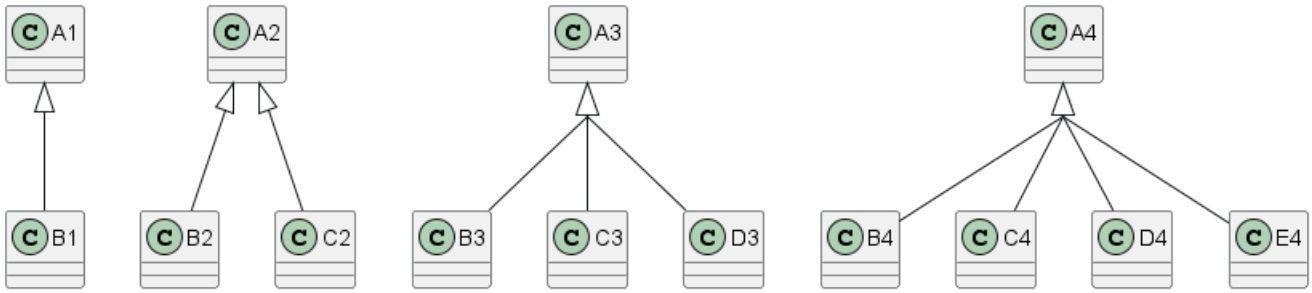
```
@startuml
skinparam groupInheritance 2

A1 <|-- B1

A2 <|-- B2
A2 <|-- C2

A3 <|-- B3
A3 <|-- C3
A3 <|-- D3

A4 <|-- B4
A4 <|-- C4
A4 <|-- D4
A4 <|-- E4
@enduml
```



3.39.3 Gruppenvererbung 3 (Gruppierung nur ab 3)

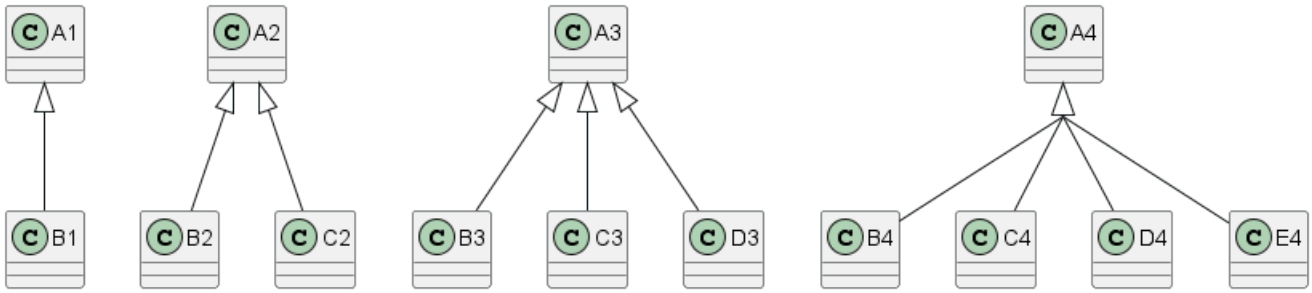
```
@startuml
skinparam groupInheritance 3

A1 <|-- B1

A2 <|-- B2
A2 <|-- C2
```

```
A3 <|-- B3
A3 <|-- C3
A3 <|-- D3

A4 <|-- B4
A4 <|-- C4
A4 <|-- D4
A4 <|-- E4
@enduml
```



3.39.4 Gruppenvererbung 4 (Gruppierung nur ab 4)

```
@startuml
skinparam groupInheritance 4

A1 <|-- B1

A2 <|-- B2
A2 <|-- C2

A3 <|-- B3
A3 <|-- C3
A3 <|-- D3

A4 <|-- B4
A4 <|-- C4
A4 <|-- D4
A4 <|-- E4
@enduml
```



[Ref. QA-3193, und Defekt QA-13532]

3.40 Anzeige von JSON-Daten im Klassen- oder Objektdiagramm

3.40.1 Einfaches Beispiel

```
@startuml
```

```
class Class
object Object
json JSON {
   "fruit":"Apple",
   "size":"Large",
   "color": ["Red", "Green"]
}
@enduml
```

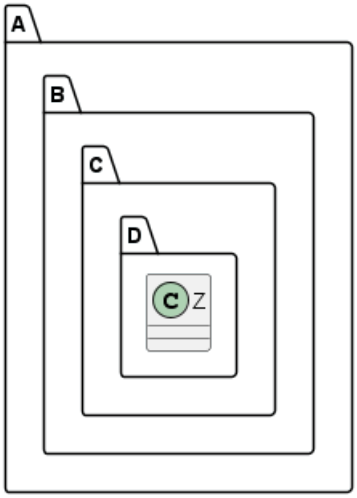
[Ref. QA-15481]

Ein weiteres Beispiel finden Sie auf der Seite JSON.

3.41 Packages and Namespaces Enhancement

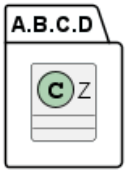
[From V1.2023.2+, and V1.2023.5]

```
@startuml
class A.B.C.D.Z {
}
@enduml
```

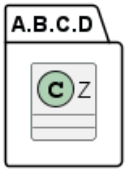



```
@startuml
set separator none
class A.B.C.D.Z {
}
@enduml
```

```
@startuml
!pragma useIntermediatePackages false
class A.B.C.D.Z {
}
@enduml
```




```
@startuml
set separator none
package A.B.C.D {
  class Z {
  }
}
@enduml
```



[Ref. GH-1352]

4 Objektdiagramm

PlantUML offers a simple and intuitive way to create object diagrams using plain text. Its user-friendly syntax allows for quick diagram creation without the need for complex GUI tools. Moreover, the [PlantUML forum](https://forum.plantuml.net/) provides a platform for users to discuss, share, and seek assistance, fostering a collaborative community. By choosing PlantUML, users benefit from both the efficiency of markdown-based diagramming and the support of an active community.

4.1 Definition von Objekten

Eine Instanz eines Objekts wird mit dem Schlüsselwort `object` definiert.

```
@startuml
object firstObject
object "My Second Object" as o2
@enduml
```

4.2 Beziehungen zwischen Objekten

Beziehungen zwischen Objekten werden mit den folgenden Symbolen definiert

Typ	Symbol	Bild
Erweiterung	`<|--`	
Zusammensetzung	`*--`	
Aggregation	`o--`	

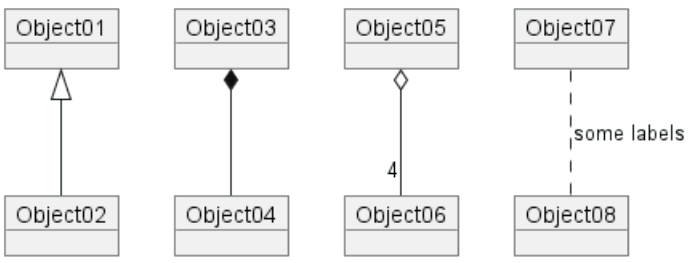
Es ist möglich, `--` durch `..` zu ersetzen, um eine gepunktete Linie zu erhalten.

Mit diesen Regeln ist es möglich, die folgenden Zeichnungen zu zeichnen.

Es ist möglich, eine Beschriftung der Beziehung hinzuzufügen, indem man `:` verwendet, gefolgt von dem Text der Beschriftung.

Für die Kardinalität kann man doppelte Anführungszeichen `""` auf jeder Seite der Beziehung verwenden.

```
@startuml
object Object01
object Object02
object Object03
object Object04
object Object05
object Object06
object Object07
object Object08

Object01 <|-- Object02
Object03 *-- Object04
Object05 o-- "4" Object06
Object07 .. Object08 : some labels
@enduml
```



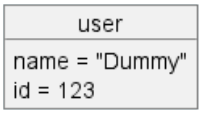
4.3 Assoziierte Objekte

```
@startuml
object o1
object o2
diamond dia
object o3

o1  --> dia
o2  --> dia
dia --> o3
@enduml
```

4.4 Hinzufügen von Attributen

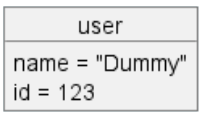
Um Attribute zu deklarieren, wird das Symbol `:`, gefolgt vom Feldnamen, verwendet:

```
@startuml

object user

user : name = "Dummy"
user : id = 123

@enduml
```



Es ist auch möglich, alle Attribute eines Objekts zwischen geschweiften Klammern `{}` aufzuführen:

```
@startuml

object user {
  name = "Dummy"
  id = 123
}

@enduml
```



4.5 Gemeinsam mit klassendiagrammen verwendete Funktionen

- Sichtbarkeit
- Hinzufügen von Notizen
- Verwendung von Paketen
- Formatieren der Ausgabe

4.6 Map table or associative array

You can define a map table or associative array, with `map` keyword and `=>` separator.

```
@startuml
map CapitalCity {
 UK => London
 USA => Washington
 Germany => Berlin
}
@enduml
```

CapitalCity	
UK	London
USA	Washington
Germany	Berlin

```
@startuml
map "Map **Contry => CapitalCity**" as CC {
 UK => London
 USA => Washington
 Germany => Berlin
}
@enduml
```

Map **Contry => CapitalCity**	
UK	London
USA	Washington
Germany	Berlin

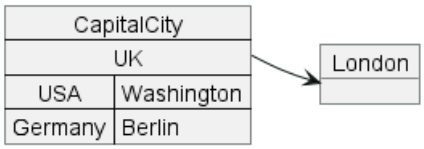
```
@startuml
map "map: Map<Integer, String>" as users {
 1 => Alice
 2 => Bob
 3 => Charlie
}
@enduml
```

map: Map<Integer, String>	
1	Alice
2	Bob
3	Charlie

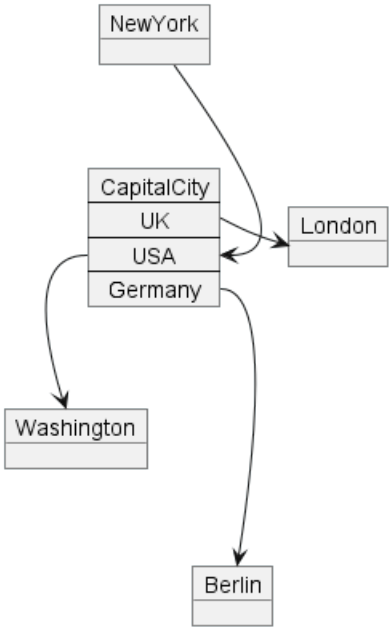
And add link with object.

```
@startuml
object London

map CapitalCity {
 UK *-> London
```

```
 USA => Washington
 Germany => Berlin
}
@enduml
```



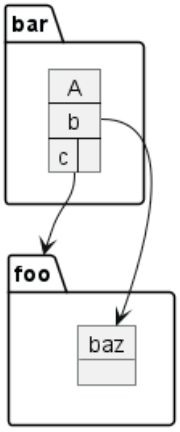

```
@startuml
object London
object Washington
object Berlin
object NewYork

map CapitalCity {
 UK *-> London
 USA *--> Washington
 Germany *---> Berlin
}

NewYork --> CapitalCity::USA
@enduml
```



[Ref. #307]

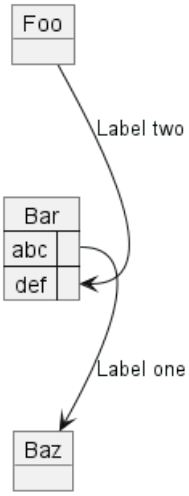
```
@startuml
package foo {
    object baz
}

package bar {
    map A {
        b *-> foo.baz
        c =>
    }
}
```

```
A::c --> foo
@enduml
```



[Ref. QA-12934]

```
@startuml
object Foo
map Bar {
  abc=>
  def=>
}
object Baz

Bar::abc --> Baz : Label one
Foo --> Bar::def : Label two
@enduml
```



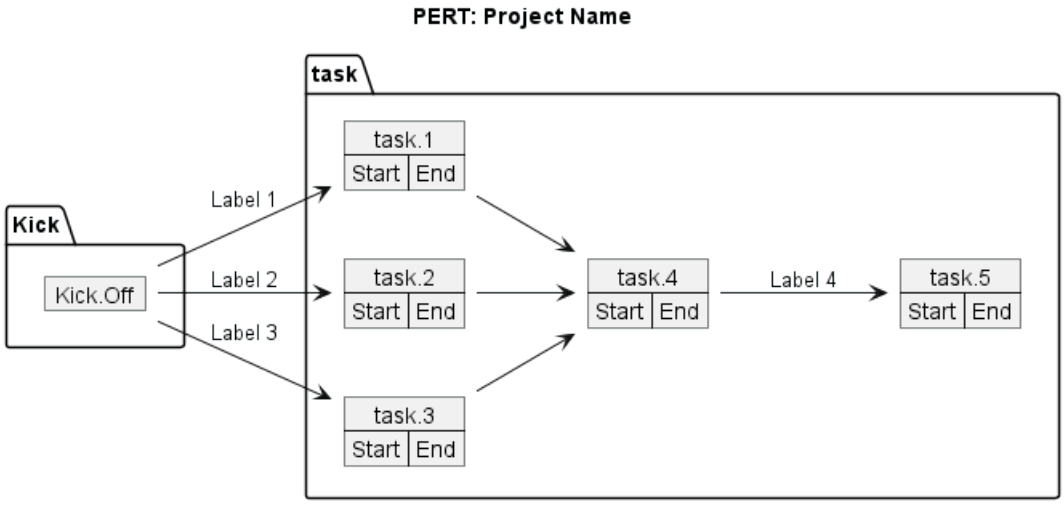
[Ref. #307]

4.7 Program (or project) evaluation and review technique (PERT) with map

You can use `map table` in order to make Program (or project) evaluation and review technique (PERT) diagram.

```
@startuml PERT
left to right direction
' Horizontal lines: -->, <--, <-->
' Vertical lines: ->, <-, <->
title PERT: Project Name
```

```
map Kick.Off {
}
map task.1 {
    Start => End
}
map task.2 {
    Start => End
}
map task.3 {
    Start => End
}
map task.4 {
    Start => End
}
map task.5 {
    Start => End
}
Kick.Off --> task.1 : Label 1
Kick.Off --> task.2 : Label 2
Kick.Off --> task.3 : Label 3
task.1 --> task.4
task.2 --> task.4
task.3 --> task.4
task.4 --> task.5 : Label 4
@enduml
```



[Ref. QA-12337]

4.8 Display JSON Data on Class or Object diagram

4.8.1 Simple example

```
@startuml
class Class
object Object
json JSON {
   "fruit":"Apple",
   "size":"Large",
   "color": ["Red", "Green"]
}
@enduml
```

[Ref. QA-15481]

For another example, see on JSON page.

5 Aktivitätsdiagramm

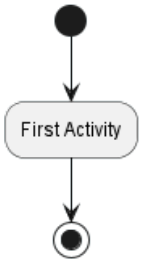
5.1 Einfache Aktivität

Mit `(*)` kann der Startknoten und der Endknoten des Aktivitätsdiagramms festgelegt werden.

In einigen Fällen kann man `(*top)` verwendet um den Startpunkt an den Anfang des Diagramms zu verlegen.

mit `-->` können Pfeile definiert werden.

```
@startuml

(*) --> "First Activity"
"First Activity" --> (*)

@enduml
```

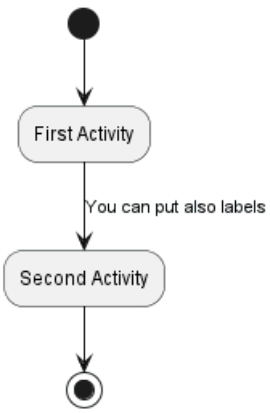


5.2 Beschriftungen an Pfeilen

Ein Pfeil beginnt automatisch an der zuletzt verwendeten Aktivität.

Pfeile lassen sich beschriften in dem man den Text für die Beschriftung in eckige Klammern (`[` und `]`) direkt hinter die Definition des Pfeils schreibt.

```
@startuml

(*) --> "First Activity"
-->[You can put also labels] "Second Activity"
--> (*)

@enduml
```



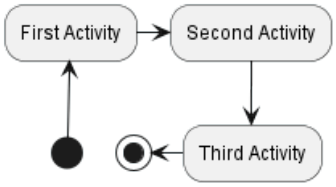
5.3 Pfeilrichtung ändern

Mit dem Symbol `->` kann ein waagerechter Pfeil erstellt werden. Mann kann die Richtung der Pfeile auch mit der folgenden Syntax beeinflussen:

- `-down->` (default arrow)

- `-right->` or `->`
- `-left->`
- `-up->`

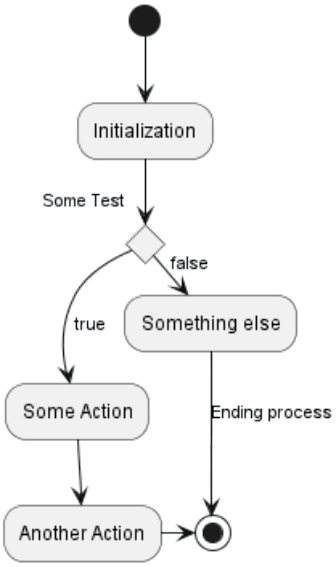
```
@startuml

(*) -up-> "First Activity"
-right-> "Second Activity"
--> "Third Activity"
-left-> (*)

@enduml
```



5.4 Verzweigungen

Sie können `if/then/else` Schlüsselwörter verwenden, um Verzweigungen zu definieren.

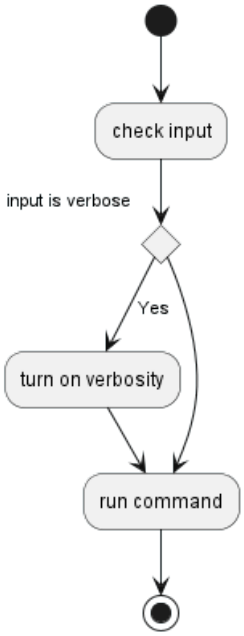
```
@startuml
(*) --> "Initialization"

if "Some Test" then
  -->[true] "Some Action"
  --> "Another Action"
  -right-> (*)
else
  ->[false] "Something else"
  -->[Ending process] (*)
endif

@enduml
```



Leider müssen Sie dann manchmal dieselbe Aktivität im Diagrammtext wiederholen:

```
@startuml
```

```
(*)  --> "check input"
If "input is verbose" then
--> [Yes] "turn on verbosity"
--> "run command"
else
--> "run command"
Endif
-->(*)
@enduml
```



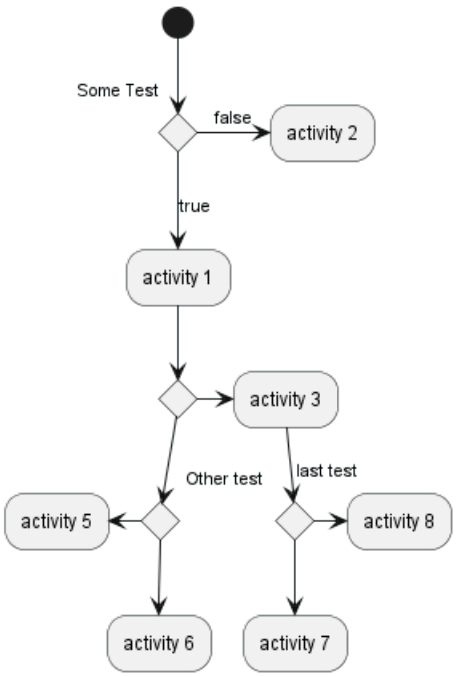
5.5 Mehr über Verzweigungen

Normalerweise ist ein eine Verzweigung mit der zuletzt definierten Aktivität verbunden. Mit dem `if` Schlüsselwort ist es aber möglich, diese Voreinstellung zu überschreiben.

Außerdem kann man Verzweigungen auch schachteln.

```
@startuml

(*) --> if "Some Test" then

  -->[true] "activity 1"

  if "" then
    -> "activity 3" as a3
  else
    if "Other test" then
      -left-> "activity 5"
    else
      --> "activity 6"
    endif
  endif

else

  ->[false] "activity 2"

endif
```

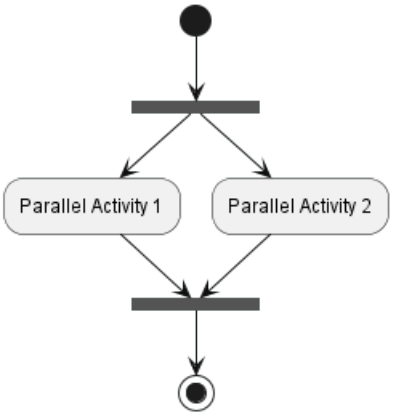
```
a3 --> if "last test" then
  --> "activity 7"
else
  -> "activity 8"
endif

@enduml
```



5.6 Synchronisation

Mit `=== code ===` können Synchronisationsbalken erzeugt werden.

```
@startuml

(*) --> ===B1===
--> "Parallel Activity 1"
--> ===B2===

===B1=== --> "Parallel Activity 2"
--> ===B2===

--> (*)

@enduml
```

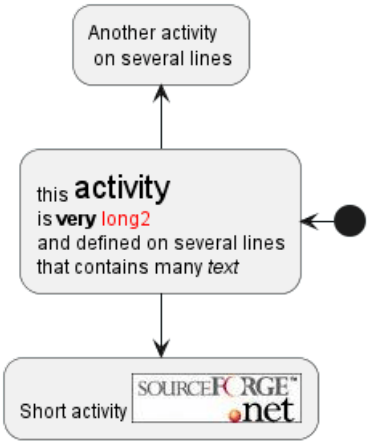


5.7 Lange Beschreibungen für Aktivitäten

Die Beschreibung einer Aktivität kann sich auch über mehrere Zeilen erstrecken. Mit dem Symbol kann ein Zeilenvorschub in die Beschreibung eingefügt werden. Außerdem kann man HTML Tags verwenden. Hier ein Beispiel:

Mit dem Schlüsselwort as kann man auch eine kurze Kodierung zur Aktivität hinzufügen. Diese Kodierung kann später in der Diagrammbeschreibung verwendet werden.

```
@startuml
(*) -left-> "this <size:20>activity</size>
is <b>very</b> <color:red>long2</color>
and defined on several lines
that contains many <i>text</i>" as A1

-up-> "Another activity\n on several lines"

A1 --> "Short activity <img:sourceforge.jpg>"
@enduml
```



5.8 Notizen

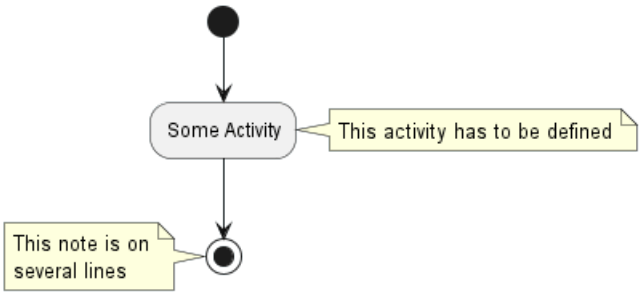
Mit den folgenden Befehlen können einer Aktivität Notizen zugeordnet werden: `note left`, `note right`, `note top` or `note bottom`, Gleich nach der Beschreibung der Aktivität die man festhalten will.

Wenn Sie eine Notiz für den Startpunkt erstellen wollen müssen Sie diese Notiz ganz am Anfang des Diagramms definieren.

Es ist auch möglich, eine Notiz mit mehreren Zeilen zu erstellen. Dazu werden die `end note` Schlüsselworte verwendet.

```
@startuml
```

```
(*) --> "Some Activity"
note right: This activity has to be defined
"Some Activity" --> (*)
note left
 This note is on
 several lines
end note

@enduml
```



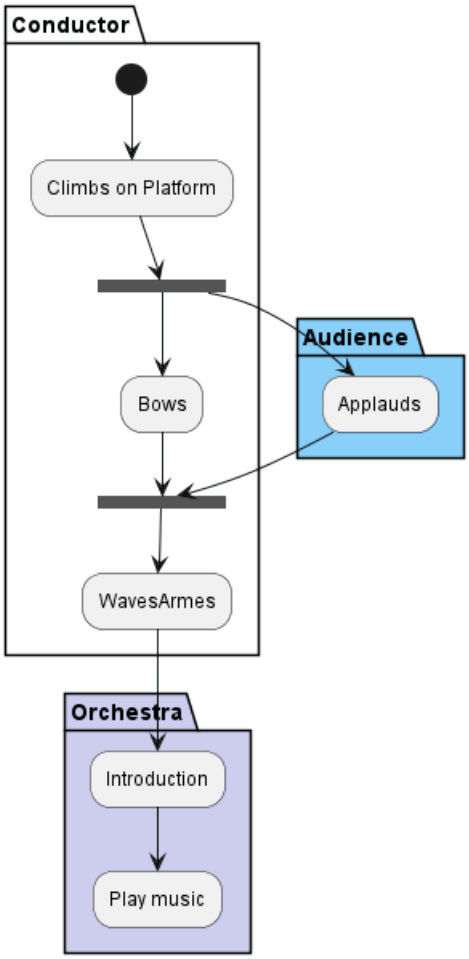
5.9 Partitionen

Partitionen können mit dem `partition` Schlüsselwort erzeugt werden. Dabei kann auch eine Hintergrundfarbe festgelegt werden.(Duch einen HTML Farbcode oder Namen).

Neue Aktivitäten werden automatisch in die zuletzt verwendete Partition eingefügt.

Eine Partition lässt sich über das `end partition` Schlüsselwort schließen.

```
@startuml

partition Conductor {
  (*) --> "Climbs on Platform"
  --> === S1 ===
  --> Bows
}

partition Audience #LightSkyBlue {
  === S1 === --> Applauds
}

partition Conductor {
  Bows --> === S2 ===
  --> WavesArmes
  Applauds --> === S2 ===
}

partition Orchestra #CCCCEE {
  WavesArmes --> Introduction
  --> "Play music"
}

@enduml
```



5.10 Der Skinparam Befehl

Mit dem `skinparam` Befehl kann man die Farbe und die Schriftart der Zeichnung verändern.

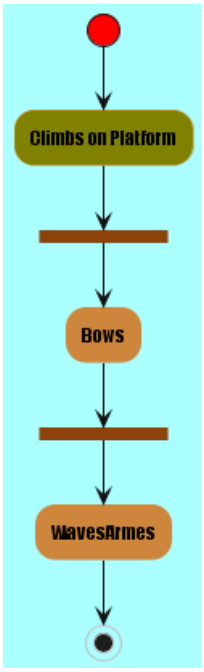
Man kann diesen Befehl wie folgt verwenden:

- In der definition des Diagramms, so wie jeden anderen Befehl auch,
- In einer eingebundenen Datei,
- In einer Konfigurationsdatei, die per Komandozeile oder ANT-Task übergeben wird.

Man kann spezifische Farben und Schriften für immer wiederkehrende Aktivitäten festlegen.

```
@startuml

skinparam backgroundColor #AAFFFF
skinparam activity {
  StartColor red
  BarColor SaddleBrown
  EndColor Silver
  BackgroundColor Peru
  BackgroundColor<< Begin >> Olive
  BorderColor Peru
  FontName Impact
}

(*) --> "Climbs on Platform" << Begin >>
--> === S1 ===
--> Bows
```

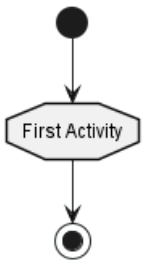
```
--> === S2 ===
--> WavesArmes
--> (*)

@enduml
```



5.11 Oktagon

Man kann die Form zu einem Oktagon mit dem Befehl `skinparam activityShape octagon` ändern.

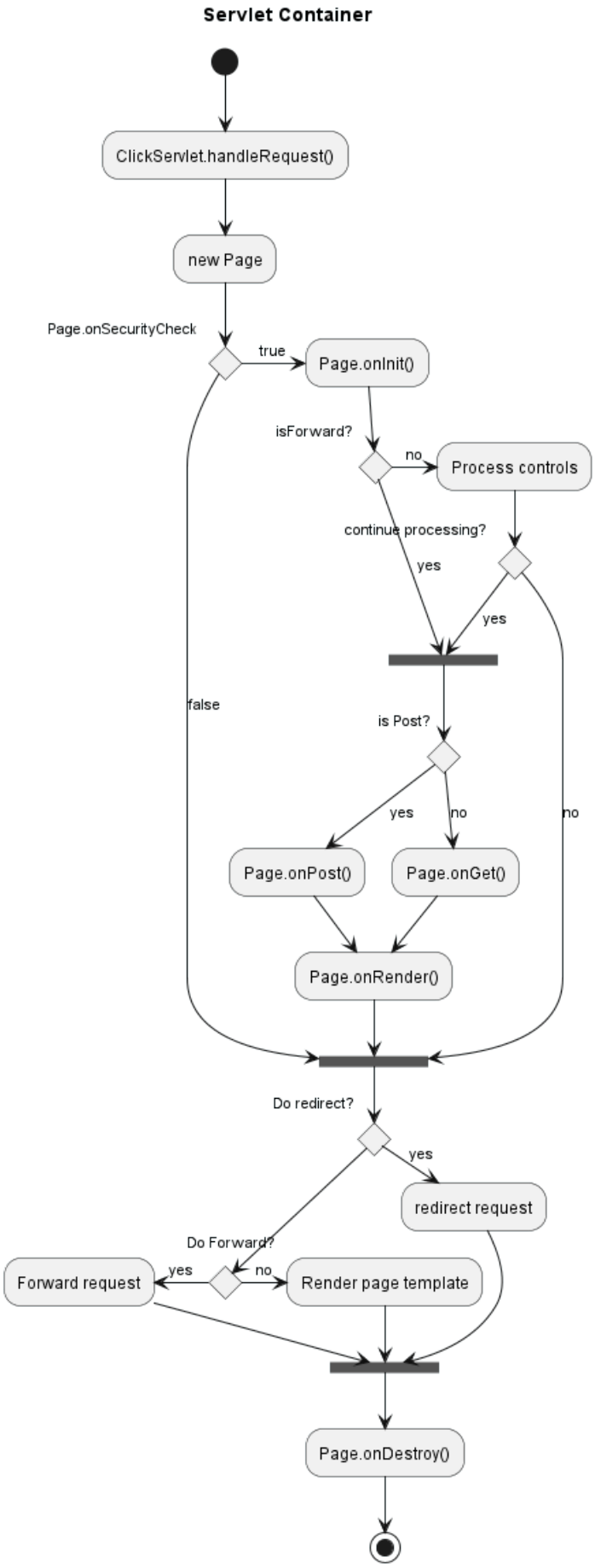
```
@startuml
'Default is skinparam activityShape roundBox
skinparam activityShape octagon

(*) --> "First Activity"
"First Activity" --> (*)

@enduml
```



5.12 Komplettes Beispiel

```
@startuml
title Servlet Container

(*) --> "ClickServlet.handleRequest()"
--> "new Page"

if "Page.onSecurityCheck" then
  ->[true] "Page.onInit()"
```

```
  if "isForward?" then
   ->[no] "Process controls"

   if "continue processing?" then
     -->[yes] ===RENDERING===
   else
     -->[no] ===REDIRECT_CHECK===
   endif

  else
   -->[yes] ===RENDERING===
  endif

  if "is Post?" then
    -->[yes] "Page.onPost()"
    --> "Page.onRender()" as render
    --> ===REDIRECT_CHECK===
  else
    -->[no] "Page.onGet()"
    --> render
  endif

else
  -->[false] ===REDIRECT_CHECK===
endif

if "Do redirect?" then
 ->[yes] "redirect request"
 --> ==BEFORE_DESTROY===
else
 if "Do Forward?" then
  -left->[yes] "Forward request"
  --> ==BEFORE_DESTROY===
 else
  -right->[no] "Render page template"
  --> ==BEFORE_DESTROY===
 endif
endif

--> "Page.onDestroy()"
-->(*)

@enduml
```


Servlet Container
ClickServlet.handleRequest()
new Page
Page.onSecurityCheck
true
Page.onInit()
isForward?
no
Process controls
continue processing?
yes
yes
false
is Post?
yes
no
no
Page.onPost()
Page.onGet()
Page.onRender()
Do redirect?
yes
redirect request
Do Forward?
Forward request
yes
no
Render page template
Page.onDestroy()

6 Aktivitätsdiagramm (neue Syntax)

Die bisherige Syntax für Aktivitätsdiagramme wies einige Einschränkungen und Probleme bei der Wartbarkeit auf. Da wir diese Nachteile erkannt haben, haben wir eine komplett überarbeitete Syntax und Implementierung eingeführt, die nicht nur benutzerfreundlich, sondern auch stabiler ist.

6.0.1 Vorteile der neuen Syntax

- Keine Abhängigkeit von Graphviz: Genau wie bei den Sequenzdiagrammen entfällt bei der neuen Syntax die Notwendigkeit einer Graphviz-Installation, wodurch der Einrichtungsprozess vereinfacht wird.
- Einfache Wartung: Die intuitive Natur der neuen Syntax bedeutet, dass es einfacher ist, Ihre Diagramme zu verwalten und zu pflegen.

6.0.2 Umstellung auf die neue Syntax

Während wir die alte Syntax weiterhin unterstützen, um die Kompatibilität aufrechtzuerhalten, ermutigen wir die Benutzer, auf die neue Syntax zu migrieren, um die verbesserten Funktionen und Vorteile, die sie bietet, zu nutzen.

Stellen Sie noch heute um und erleben Sie einen rationalisierten und effizienten Diagrammprozess mit der neuen Aktivitätsdiagramm-Syntax.

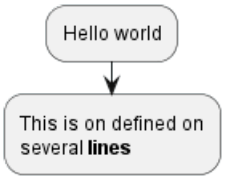
6.1 Einfache Aktivität

Aktivitäts-Labels beginnen mit `:` und enden mit `;`.

Textformatierungen können mit Creole Wiki Syntax erfolgen.

Sie sind in ihrer Festlegungsreihenfolge indirekt verbunden.

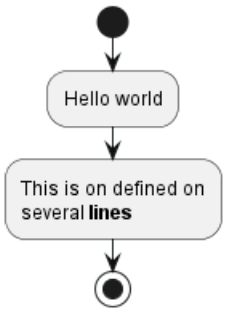
```
@startuml
:Hello world;
:This is on defined on
several **lines**;
@enduml
```



6.2 Start Stop End

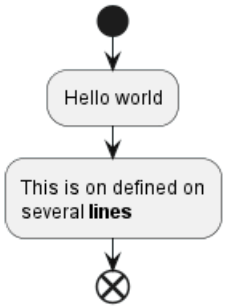
Man kann die `start` und `stop` Schlüsselwörter verwenden um Beginn und Ende des Diagramms zu kennzeichnen.

```
@startuml
start
:Hello world;
:This is on defined on
several **lines**;
stop
@enduml
```



Das Schlüsselwort `end` beendet ebenfalls das Diagramm, zeigt aber als Symbol den durchkreuzten Kreis.

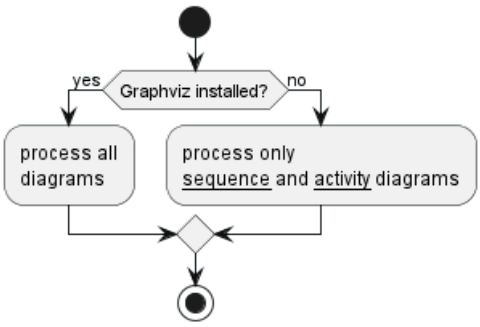
```
@startuml
start
:Hello world;
:This is on defined on
several **lines**;
end
@enduml
```



6.3 Bedingung

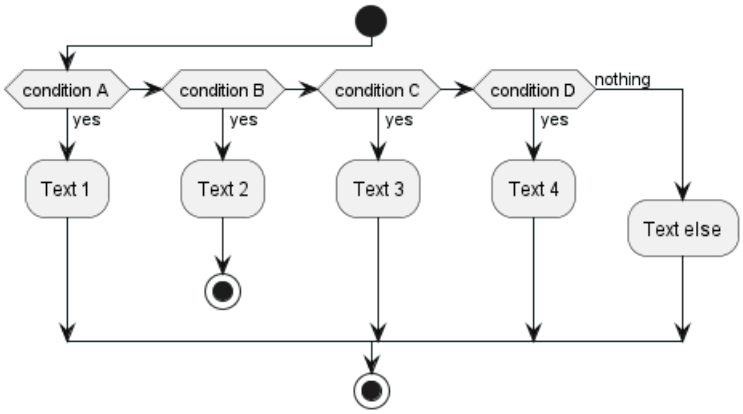
Man kann die Schlüsselwörter `if`, `then` und `else` verwenden, um Verzweigungen ins Diagramm einzufügen. Beschreibungen hierzu können innerhalb von Klammern angegeben werden.

```
@startuml

start

if (Graphviz installed?) then (yes)
  :process all\ndiagrams;
else (no)
  :process only
  __sequence__ and __activity__ diagrams;
endif

stop

@enduml
```



Man kann das Schlüsselwort `elseif` für mehrere Abfragen verwenden:

```
@startuml
start
if (condition A) then (yes)
  :Text 1;
elseif (condition B) then (yes)
  :Text 2;
  stop
elseif (condition C) then (yes)
  :Text 3;
elseif (condition D) then (yes)
  :Text 4;
else (nothing)
  :Text else;
endif
stop
@enduml
```



*[Refs. [QA-3931](https:*forum.plantuml.net/3931/please-provide-elseif-structure-vertically-activity-diagrams), [issue-582](https:*github.com/plantuml/plantuml/issues/582)]*

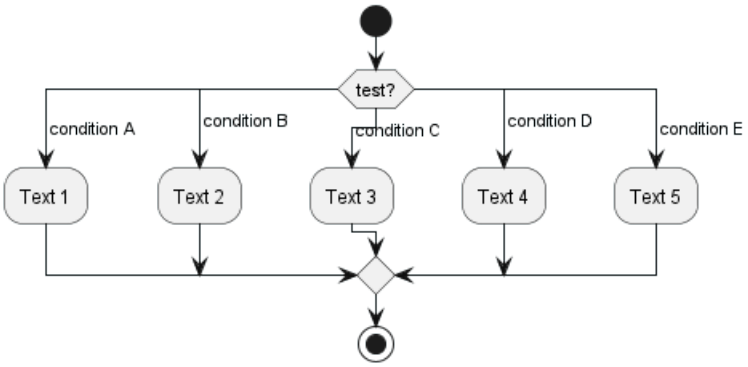
6.4 Switch and case [switch, case, endswitch]

You can use `switch`, `case` and `endswitch` keywords to put switch in your diagram.

Labels can be provided using parentheses.

```
@startuml
start
switch (test?)
case ( condition A )
  :Text 1;
case ( condition B )
  :Text 2;
```

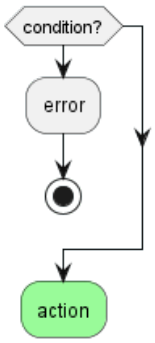
```
case ( condition C )
  :Text 3;
case ( condition D )
  :Text 4;
case ( condition E )
  :Text 5;
endswitch
stop
@enduml
```



6.5 Conditional with stop on an action [kill, detach]

You can stop action on a if loop.

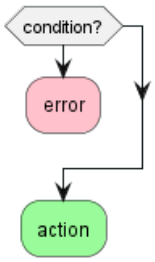
```
@startuml
if (condition?) then
  :error;
  stop
endif
#palegreen:action;
@enduml
```



But if you want to stop at the precise action, you can use the `kill` or `detach` keyword:

- `kill`

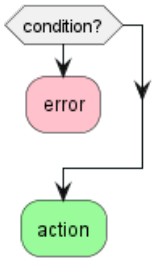
```
@startuml
if (condition?) then
  #pink:error;
  kill
endif
#palegreen:action;
@enduml
```



[Ref. QA-265]

- `detach`

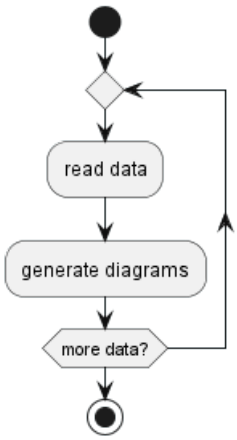
```
@startuml
if (condition?) then
  #pink:error;
  detach
endif
#palegreen:action;
@enduml
```



6.6 Repeat-Schleife

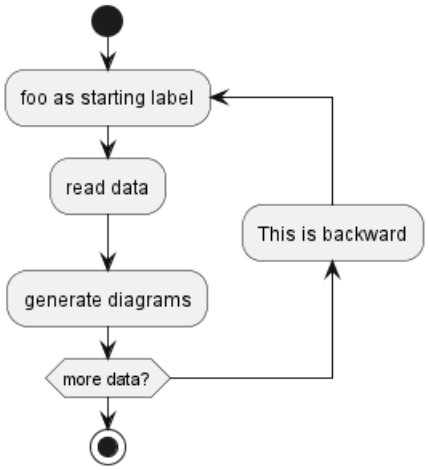
Mit den `repeat` und `repeatwhile` Schlüsselwörtern können Repeat-Schleifen dargestellt werden.

```
@startuml

start

repeat
  :read data;
  :generate diagrams;
repeat while (more data?)

stop

@enduml
```



It is also possible to use a full action as `repeat` target and insert an action in the return path using the `backward` keyword.

```
@startuml

start

repeat :foo as starting label;
  :read data;
  :generate diagrams;
backward:This is backward;
repeat while (more data?)

stop

@enduml
```



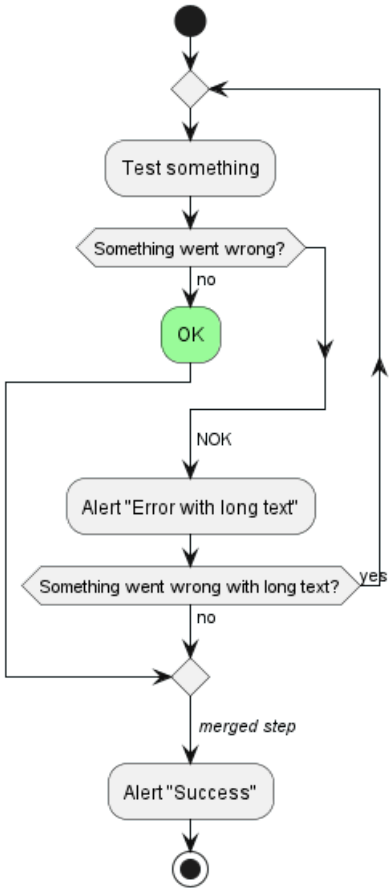
*[Ref. [QA-5826](https://forum.plantuml.net/5826/please-provide-action-repeat-loop-start-instead-condition?show=5831

6.7 Break on a repeat loop [break]

You can use the `break` keyword after an action on a loop.

```
@startuml
start
repeat
  :Test something;
    if (Something went wrong?) then (no)
      #palegreen:OK;
```

```
      break
    endif
    ->NOK;
    :Alert "Error with long text";
repeat while (Something went wrong with long text?) is (yes) not (no)
->//merged step//;
:Alert "Success";
stop
@enduml
```



[Ref. QA-6105]

6.8 Goto and Label Processing [label, goto]

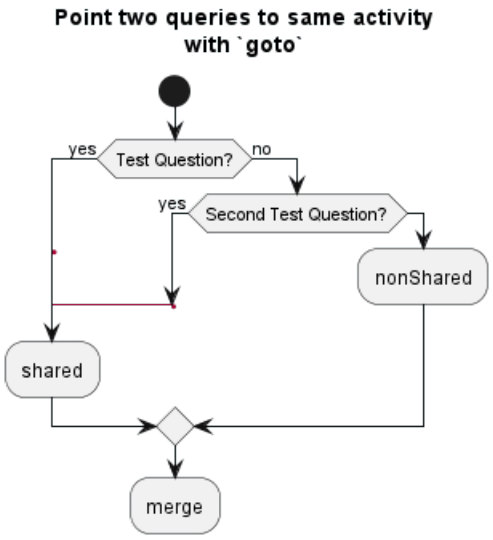
It is currently only experimental

You can use `label` and `goto` keywords to denote goto processing, with:

- `label <label_name>`
- `goto <label_name>`

```
@startuml
title Point two queries to same activity\nwith `goto`
start
if (Test Question?) then (yes)
'space label only for alignment
label sp_lab0
label sp_lab1
'real label
label lab
:shared;
```

```
else (no)
if (Second Test Question?) then (yes)
label sp_lab2
goto sp_lab1
else
:nonShared;
endif
endif
:merge;
@enduml
```

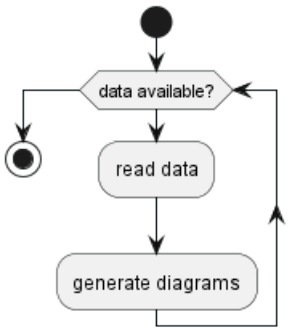


[Ref. QA-15026, QA-12526 and initially QA-1626]

6.9 While-Schleife

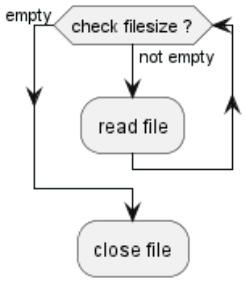
Mit den `while` und `end while` Schlüsselwörtern können While-Schleifen dargestellt werden.

```
@startuml

start

while (data available?)
  :read data;
  :generate diagrams;
endwhile

stop

@enduml
```



Es ist möglich eine Beschriftung hinter dem `endwhile` Schlüsselwort anzugeben. Eine Beschriftung kann aber auch mit dem `is` Schlüsselwort hinzugefügt werden..

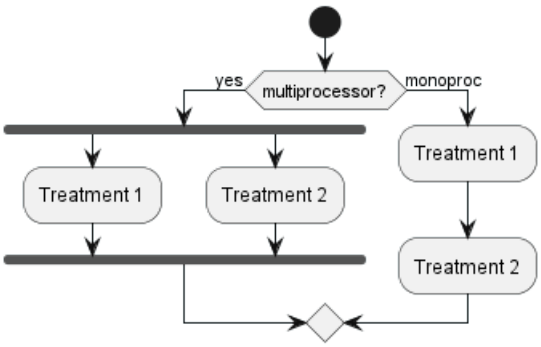
```
@startuml
while (check filesize ?) is (not empty)
  :read file;
endwhile (empty)
:close file;
@enduml
```



6.10 Parallele Verarbeitung

Mit dem `fork`, `fork again` und `end fork` Schlüsselworten kann eine parallele Verarbeitung angezeigt werden.

```
@startuml

start

if (multiprocessor?) then (yes)
  fork
    :Treatment 1;
  fork again
    :Treatment 2;
  end fork
else (monoproc)
  :Treatment 1;
  :Treatment 2;
endif

@enduml
```

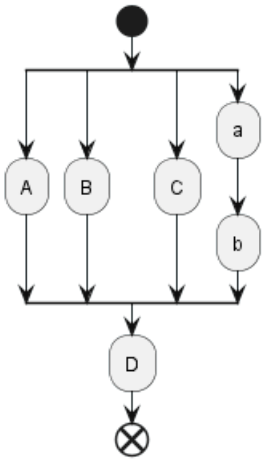


6.11 Split processing

6.11.1 Split

You can use `split`, `split again` and `end split` keywords to denote split processing.

```
@startuml
start
split
   :A;
split again
   :B;
split again
   :C;
split again
   :a;
   :b;
end split
:D;
end
@enduml
```

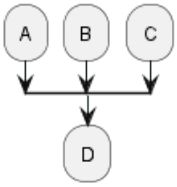


6.11.2 Input split (multi-start)

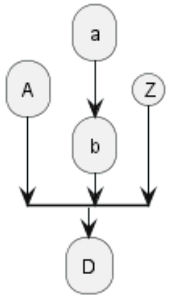
You can use `hidden` arrows to make an input split (multi-start):

```
@startuml
split
   -[hidden]->
   :A;
split again
   -[hidden]->
```

```
   :B;
split again
   -[hidden]->
   :C;
end split
:D;
@enduml
```




```
@startuml
split
   -[hidden]->
   :A;
split again
   -[hidden]->
   :a;
   :b;
split again
   -[hidden]->
   (Z)
end split
:D;
@enduml
```



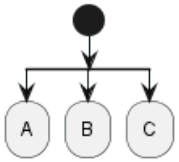
[Ref. QA-8662]

6.11.3 Output split (multi-end)

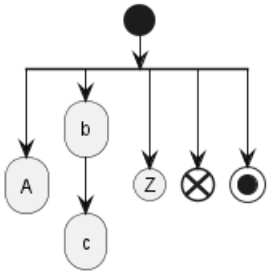
You can use `kill` or `detach` to make an output split (multi-end):

```
@startuml
start
split
   :A;
   kill
split again
   :B;
   detach
split again
   :C;
   kill
```

```
end split
@enduml
```




```
@startuml
start
split
   :A;
   kill
split again
   :b;
   :c;
   detach
split again
   (Z)
   detach
split again
   end
split again
   stop
end split
@enduml
```

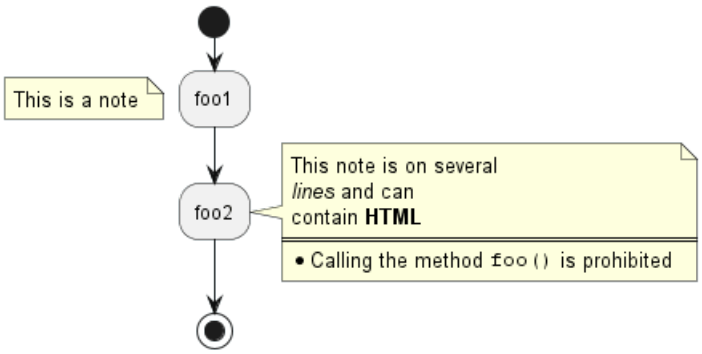


6.12 Notizen

Textformatierung kann mit Creole Wiki Syntax gemacht werden.

Eine Anmerkung kann auch schweben, indem das Schlüsselwort `floating` benutzt wird.

```
@startuml

start
:foo1;
floating note left: This is a note
:foo2;
note right
  This note is on several
  //lines// and can
  contain <b>HTML</b>
  ====
  * Calling the method ""foo()"" is prohibited
end note
stop

@enduml
```

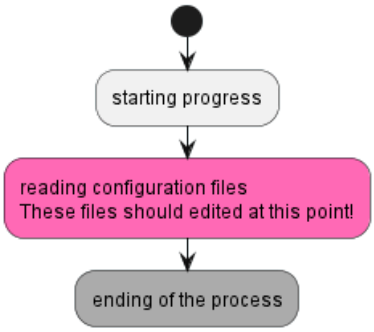


[Ref. [QA-2398](https://forum.plantuml.net/2398/is-it-possible-to-add-a-comment-on-top-of-a-activity-partition?show=2403#a2403)]

6.13 Farben

Man kann spezielle Farben für gewisse Aktivitäten verwenden

```
@startuml

start
:starting progress;
#HotPink:reading configuration files
These files should edited at this point!;
#AAAAAA:ending of the process;

@enduml
```

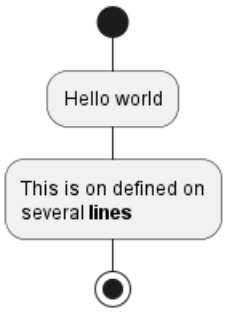


[Ref. [QA-4906](https://forum.plantuml.net/4906/setting-ad-hoc-gradient-backgrounds-in-activity?show=4917#a4917)]

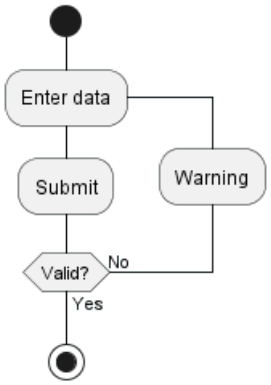
6.14 Lines without arrows

You can use `skinparam ArrowHeadColor none` in order to connect activities using lines only, without arrows.

```
@startuml
skinparam ArrowHeadColor none
start
:Hello world;
:This is on defined on
several **lines**;
stop
@enduml
```




```
@startuml
skinparam ArrowHeadColor none
start
repeat :Enter data;
:Submit;
backward :Warning;
repeat while (Valid?) is (No) not (Yes)
stop
@enduml
```

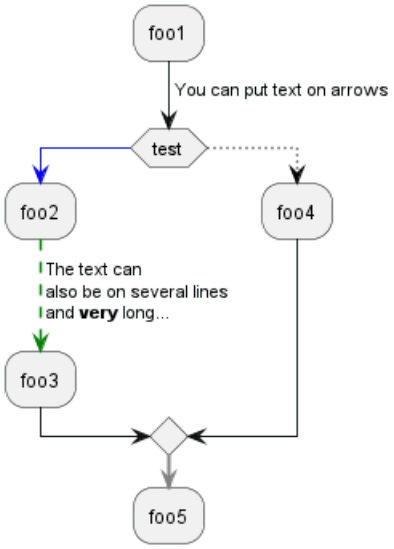


6.15 Pfeile

Über die -> Notation, können Texte an den Pfeilen angezeigt werden und die Farbe der Pfeile geändert werden.

Es sind auch gepunktete, gestrichelte, dicke oder unsichtbare Pfeile möglich.

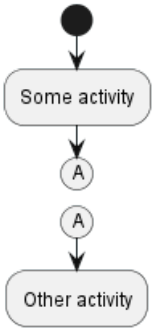
```
@startuml
:foo1;
-> You can put text on arrows;
if (test) then
  -[#blue]->
  :foo2;
  -[#green,dashed]-> The text can
  also be on several lines
  and **very** long...;
  :foo3;
else
  -[#black,dotted]->
  :foo4;
endif
-[#gray,bold]->
:foo5;
@enduml
```



6.16 Connector

You can use parentheses to denote connector.

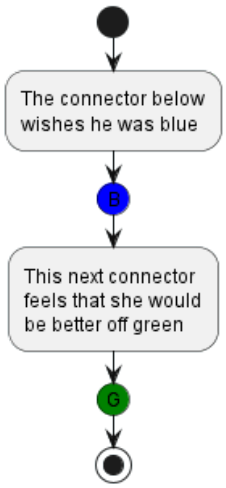
```
@startuml
start
:Some activity;
(A)
detach
(A)
:Other activity;
@enduml
```



6.17 Color on connector

You can add color on connector.

```
@startuml
start
:The connector below
wishes he was blue;
#blue:(B)
:This next connector
feels that she would
be better off green;
#green:(G)
stop
@enduml
```

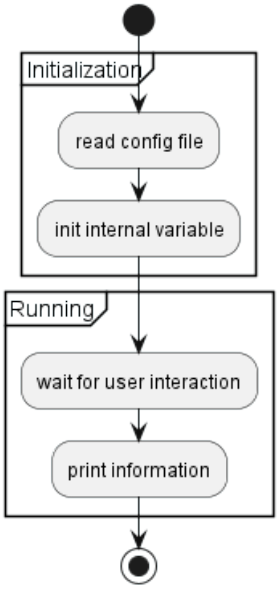


[Ref. QA-10077]

6.18 Gruppierung

Aktivitäten können durch Partitionen gruppiert werden:

```
@startuml
start
partition Initialization {
    :read config file;
    :init internal variable;
}
partition Running {
    :wait for user interaction;
    :print information;
}

stop
@enduml
```



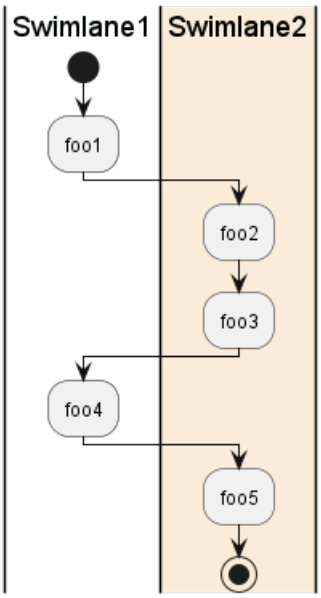
[Ref. [QA-2793](https://forum.plantuml.net/2793/activity-beta-partition-name-more-than-one-word-does-not-work?show=2798#a2798)] *[Ref. [QA-542](https://forum.plantuml.net/542/ability-to-define-hyperlink-on-diagram-elements?show=14003#c14003)]*

6.19 Schwimmbahnen

Mit dem Pipe Zeichen | kann man Schwimmbahnen definieren.

Es ist auch möglich die Schwimmbahnfarbe zu ändern.

```
@startuml
|Swimlane1|
start
:foo1;
|#AntiqueWhite|Swimlane2|
:foo2;
:foo3;
|Swimlane1|
:foo4;
|Swimlane2|
:foo5;
stop
@enduml
```



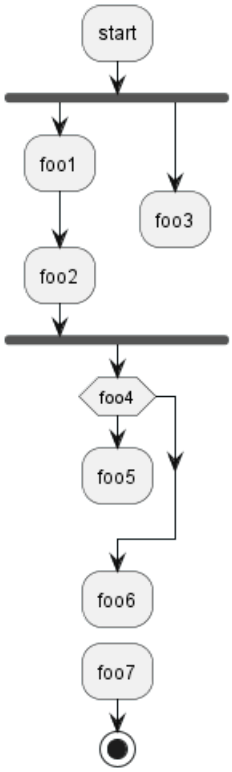
[Ref. [QA-2681](https://forum.plantuml.net/2681/possible-define-alias-swimlane-place-alias-everywhere-else?show=2685#a2685)]

6.20 Abtrennen

Es ist möglich mit dem `detach` Schlüsselwort einen Pfeil zu entfernen.

```
@startuml
 :start;
 fork
   :foo1;
   :foo2;
 fork again
   :foo3;
   detach
 endfork
 if (foo4) then
   :foo5;
   detach
 endif
 :foo6;
```

```
 detach
 :foo7;
 stop
@enduml
```



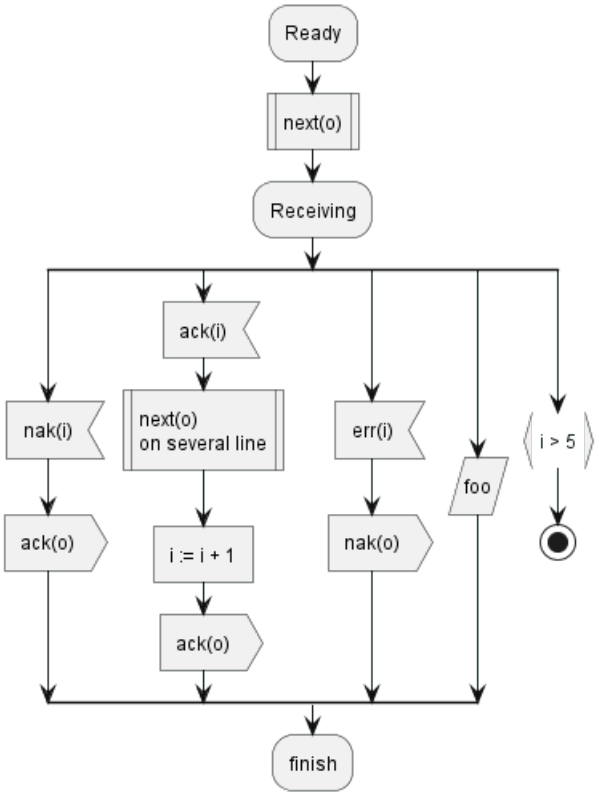
6.21 SDL-Diagramme

Durch Ändern des letzten Separators ; können Sie unterschiedliche Wiedergabe für die Aktivität einstellen:

- |
- <
- >
- /
-]
- }

```
@startuml
:Ready;
:next(o)|
:Receiving;
split
 :nak(i)<
 :ack(o)>
split again
 :ack(i)<
 :next(o)
 on several line|
 :i := i + 1]
 :ack(o)>
split again
```

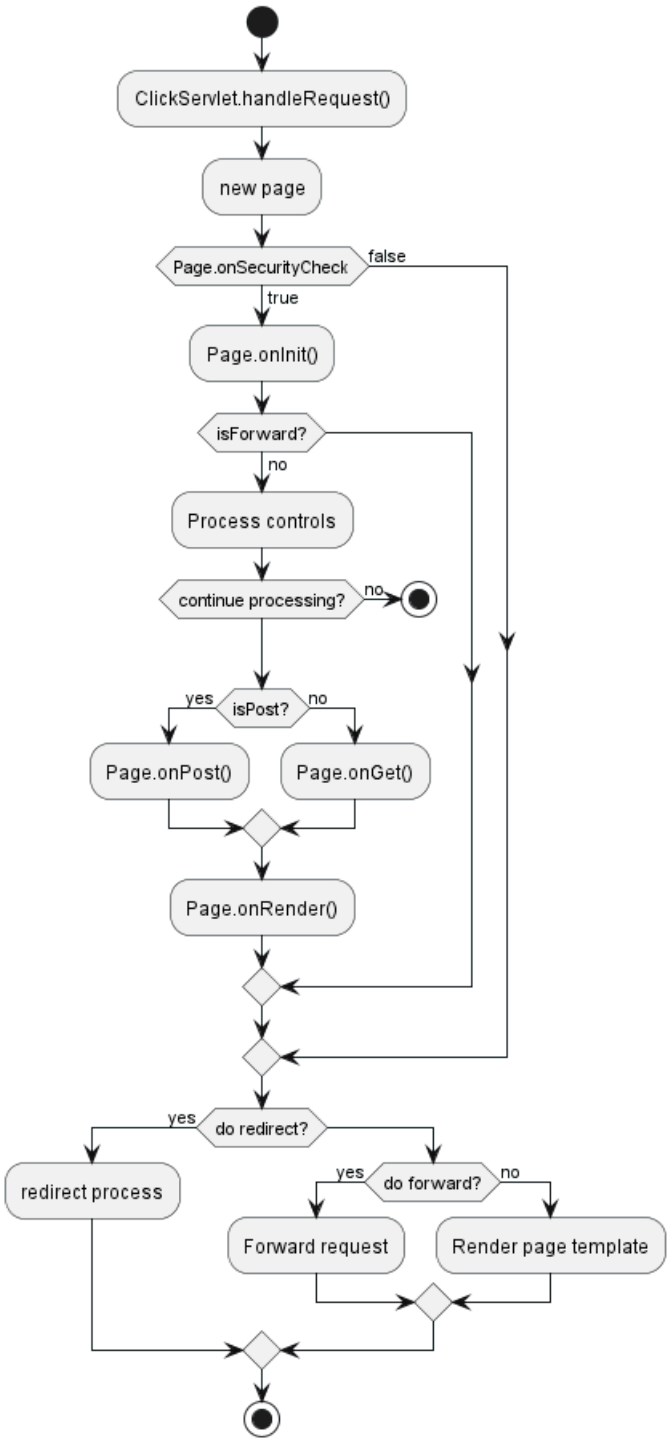
```
 :err(i)<
 :nak(o)>
split again
 :foo/
split again
 :i > 5}
stop
end split
:finish;
@enduml
```



6.22 Komplettes Beispiel

```
@startuml

start
:ClickServlet.handleRequest();
:new page;
if (Page.onSecurityCheck) then (true)
  :Page.onInit();
  if (isForward?) then (no)
    :Process controls;
    if (continue processing?) then (no)
      stop
    endif

    if (isPost?) then (yes)
      :Page.onPost();
    else (no)
      :Page.onGet();
    endif
    :Page.onRender();
```

```
  endif
else (false)
endif

if (do redirect?) then (yes)
  :redirect process;
else
  if (do forward?) then (yes)
    :Forward request;
  else (no)
    :Render page template;
  endif
endif

stop

@enduml
```

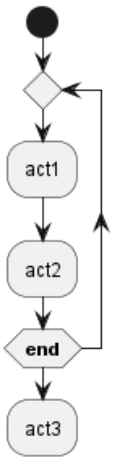


6.23 Condition Style

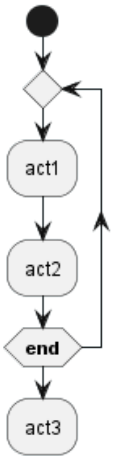
6.23.1 Inside style (by default)

```
@startuml
skinparam conditionStyle inside
start
repeat
  :act1;
  :act2;
repeatwhile (<b>end)
:act3;
```

```
@enduml
```

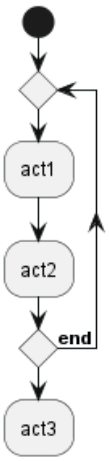



```
@startuml
start
repeat
  :act1;
  :act2;
repeatwhile (<b>end)
:act3;
@enduml
```



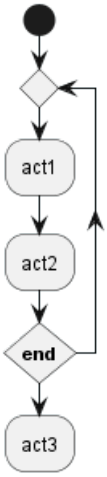
6.23.2 Diamond style

```
@startuml
skinparam conditionStyle diamond
start
repeat
  :act1;
  :act2;
repeatwhile (<b>end)
:act3;
@enduml
```

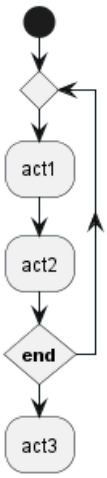


6.23.3 InsideDiamond (or *Foo1*) style

```
@startuml
skinparam conditionStyle InsideDiamond
start
repeat
  :act1;
  :act2;
repeatwhile (<b>end)
:act3;
@enduml
```




```
@startuml
skinparam conditionStyle foo1
start
repeat
  :act1;
  :act2;
repeatwhile (<b>end)
:act3;
@enduml
```



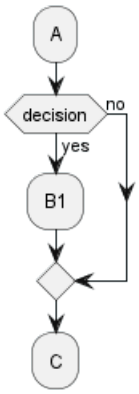
[Ref. QA-1290 and #400]

6.24 Condition End Style

6.24.1 Diamond style (by default)

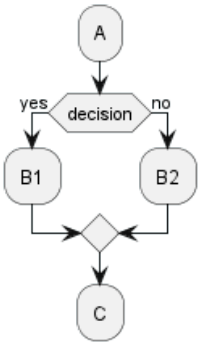
- With one branch

```
@startuml
skinparam ConditionEndStyle diamond
:A;
if (decision) then (yes)
    :B1;
else (no)
endif
:C;
@enduml
```



- With two branches (`B1`, `B2`)

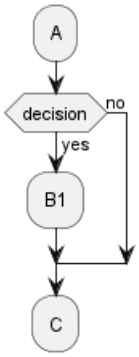
```
@startuml
skinparam ConditionEndStyle diamond
:A;
if (decision) then (yes)
    :B1;
else (no)
    :B2;
endif
:C;
@enduml
@enduml
```



6.24.2 Horizontal line (hline) style

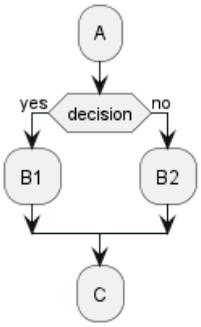
- With one branch

```
@startuml
skinparam ConditionEndStyle hline
:A;
if (decision) then (yes)
    :B1;
else (no)
endif
:C;
@enduml
```



- With two branches (`B1`, `B2`)

```
@startuml
skinparam ConditionEndStyle hline
:A;
if (decision) then (yes)
    :B1;
else (no)
    :B2;
endif
:C;
@enduml
@enduml
```

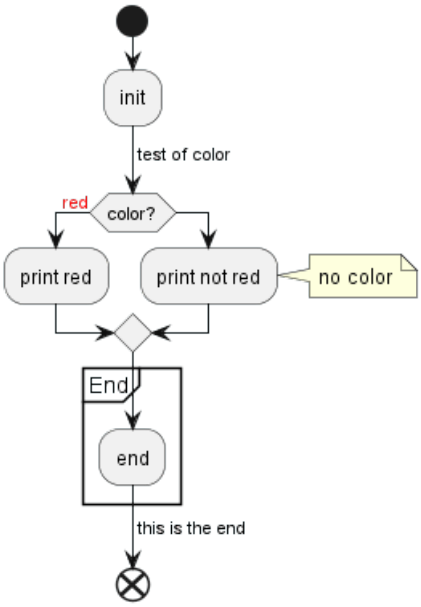


[Ref. QA-4015]

6.25 Using (global) style

6.25.1 Without style *(by default)*

```
@startuml
start
:init;
-> test of color;
if (color?) is (<color:red>red) then
:print red;
else
:print not red;
note right: no color
endif
partition End {
:end;
}
-> this is the end;
end
@enduml
```

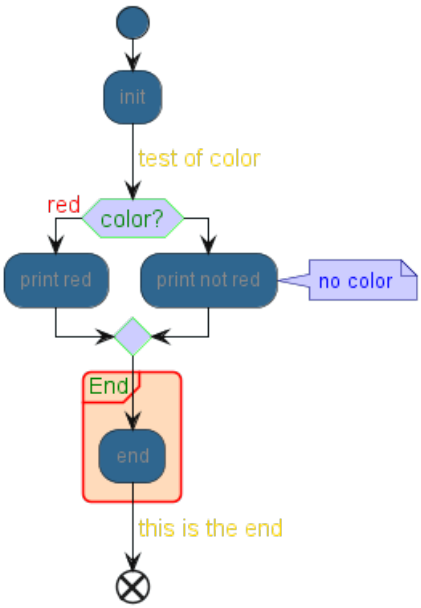


6.25.2 With style

You can use style to change rendering of elements.

```
@startuml
```

```
<style>
activityDiagram {
  BackgroundColor #33668E
  BorderColor #33668E
  FontColor #888
  FontName arial

  diamond {
    BackgroundColor #ccf
    LineColor #00FF00
    FontColor green
    FontName arial
    FontSize 15
  }
  arrow {
    FontColor gold
    FontName arial
    FontSize 15
  }
  partition {
    LineColor red
    FontColor green
    RoundCorner 10
    BackgroundColor PeachPuff
  }
  note {
    FontColor Blue
    LineColor Navy
    BackgroundColor #ccf
  }
}
document {
   BackgroundColor transparent
}
</style>
start
:init;
-> test of color;
if (color?) is (<color:red>red) then
:print red;
else
:print not red;
note right: no color
endif
partition End {
:end;
}
-> this is the end;
end
@enduml
```


init
test of color
red
color?
print red
print not red
no color
End
end
this is the end

7 Komponentendiagramm

Schauen wir uns ein paar Beispiele an.

Advantages of PlantUML:

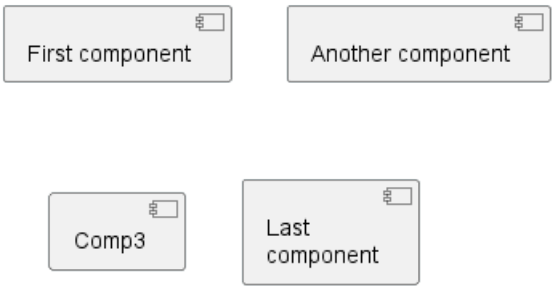
- **Simplicity**: With PlantUML, you can create component diagrams using simple and intuitive text-based descriptions, eliminating the need for complex drawing tools.
- **Integration**: PlantUML seamlessly integrates with various tools and platforms, making it a versatile choice for developers and architects.
- **Collaboration**: The [PlantUML forum](https://forum.plantuml.net/) offers a platform for users to discuss, share, and seek assistance on their diagrams, fostering a collaborative community.

7.1 Komponenten

Komponenten werden mittels eckiger Klammern definiert.

Alternativ kann das Schlüsselwort `component` verwendet werden, um eine Komponente zu definieren. Mittels Schlüsselwort `as` lassen sich Aliase definieren. Aliase können verwendet werden, wenn Beziehungen definiert werden.

```
@startuml

[First component]
[Another component] as Comp2
component Comp3
component [Last\ncomponent] as Comp4

@enduml
```



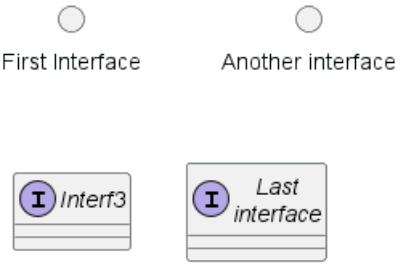
7.2 Schnittstellen

Schnittstellen werden mit zwei Runden Klammern `()` definiert.

Alternativ kann das Schlüsselwort `interface` verwendet werden, um Schnittstellen zu definieren. Mittels Schlüsselwort `as` lassen sich Aliase definieren. Aliase können verwendet werden, wenn Beziehungen definiert werden.

Die Deklaration von Schnittstellen ist optional.

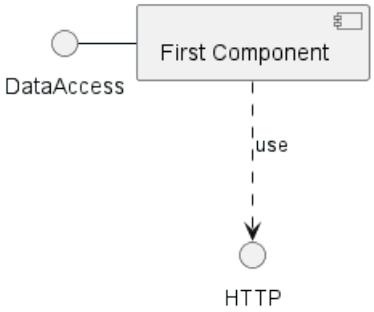
```
@startuml

() "First Interface"
() "Another interface" as Interf2
interface Interf3
interface "Last\ninterface" as Interf4

@enduml
```



7.3 Grundlegendes Beispiel

Verbindungen zwischen Elementen werden durch Kombinationen von gepunkteten Linien (`..`), geraden Linien (`--`) und Pfeilen (`-->`) hergestellt

```
@startuml

DataAccess - [First Component]
[First Component] ..> HTTP : use

@enduml
```

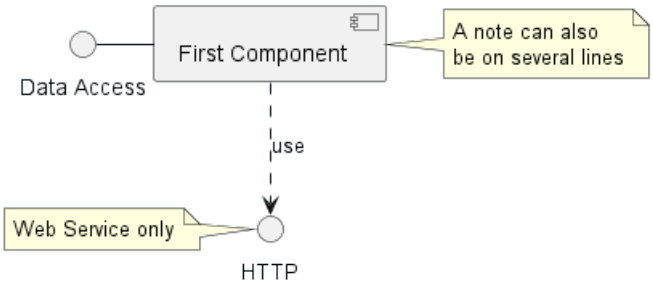


7.4 Notizen

Schlüsselwörter: `note left of` , `note right of` , `note top of` , `note bottom of` Diese Schlüsselwörter können eingesetzt werden, um Notizen für ein einzelnes Objekt zu erstellen.

Eine Notiz kann mit `note` definiert werden. Danach kann sie mittels `..` mit anderen Objekten verbunden werden.

```
@startuml

interface "Data Access" as DA

DA - [First Component]
[First Component] ..> HTTP : use

note left of HTTP : Web Service only

note right of [First Component]
  A note can also
  be on several lines
end note

@enduml
```

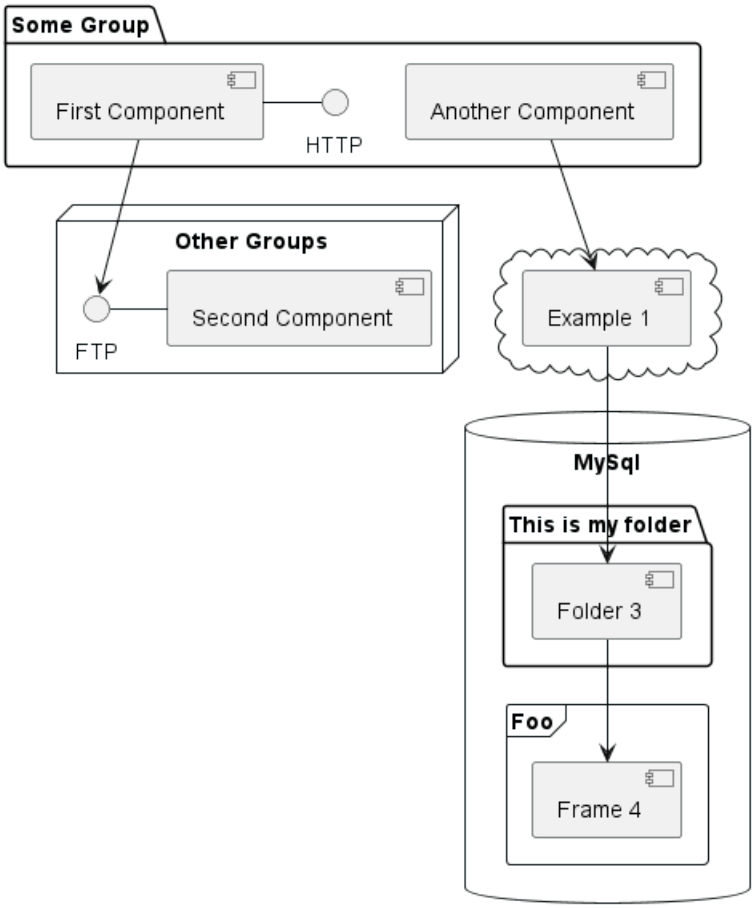


7.5 Gruppierende Komponenten

Mit `package` lassen sich Komponenten und Schnittstellen gruppieren.

- `package`
- `node`
- `folder`
- `frame`
- `cloud`
- `database`

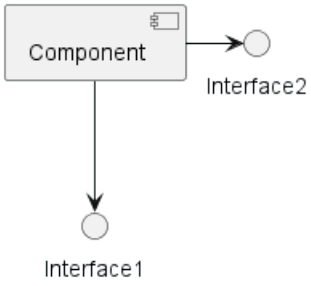
```
@startuml

package "Some Group" {
  HTTP - [First Component]
  [Another Component]
}

node "Other Groups" {
  FTP - [Second Component]
  [First Component] --> FTP
}

cloud {
  [Example 1]
}


database "MySql" {
  folder "This is my folder" {
    [Folder 3]
  }
  frame "Foo" {
    [Frame 4]
  }
}


[Another Component] --> [Example 1]
[Example 1] --> [Folder 3]
[Folder 3] --> [Frame 4]

@enduml
```



7.6 Ändern der Pfeilrichtung

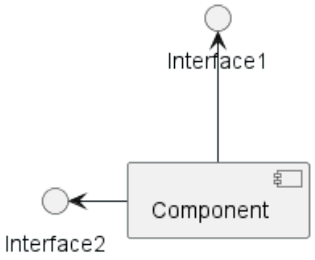
Verbindungen werden mit zwei Minus-Zeichen `--` definiert und sind vertikal orientiert. Um eine horizontale Orientierung zu erhalten, kann die Verbindung mit nur einem Minus-Zeichen (oder Punkt) definiert werden:

```
@startuml
[Component] --> Interface1
[Component] -> Interface2
@enduml
```



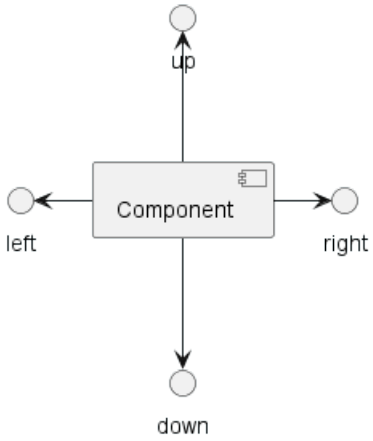
Die Pfeilsymbole können umgedreht werden, um die Pfeilrichtung zu ändern:

```
@startuml
Interface1 <-- [Component]
Interface2 <- [Component]
@enduml
```



Die Pfeilrichtung lässt sich auch mit den Schlüsselwörtern `left`, `right`, `up` und `down` ändern. Diese Schlüsselwörter werden innerhalb des Pfeil-Symbols eingesetzt:

```
@startuml
[Component] -left-> left
[Component] -right-> right
[Component] -up-> up
[Component] -down-> down
@enduml
```



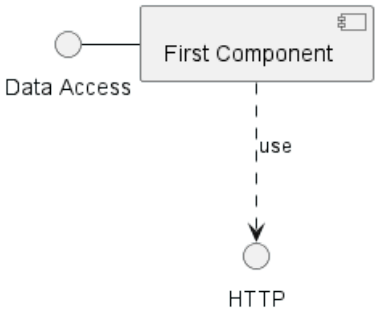
Die Pfeillänge kann verkürzt werden, wenn bei der Deklaration der Pfeilrichtung nur der Anfangsbuchstabe (oder ersten zwei Anfangsbuchstaben) verwendet werden: Beispielsweise `-d-` oder `-do-` statt `-down-`.

Diese Funktionalität ist jedoch mit Bedacht einzusetzen, da *GraphViz* normalerweise gute Resultate ohne manuelle Eingriffe erzielt.

7.7 Use UML2 notation

By default *(from v1.2020.13-14)*, UML2 notation is used.

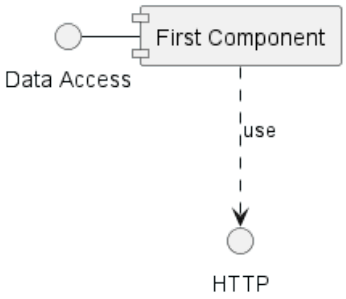
```
@startuml

interface "Data Access" as DA

DA - [First Component]
[First Component] ..> HTTP : use

@enduml
```



7.8 UML1-Notation verwenden

Der `skinparam componentStyle uml1` Befehl wird werwendet, um in die UML1 Notation umzuschalten.

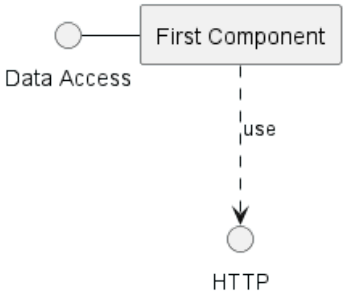
```
@startuml
skinparam componentStyle uml1

interface "Data Access" as DA

DA - [First Component]
[First Component] ..> HTTP : use

@enduml
```



7.9 Use rectangle notation (remove UML notation)

The `skinparam componentStyle rectangle` command is used to switch to rectangle notation *(without any UML notation)*.

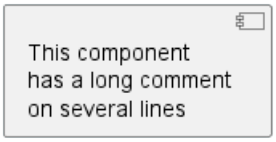
```
@startuml
skinparam componentStyle rectangle

interface "Data Access" as DA

DA - [First Component]
[First Component] ..> HTTP : use

@enduml
```



7.10 Mehrzeilige Beschreibung

Es ist möglich mehrzeilige Beschreibungen zu erstellen mithilfe von eckigen Klammern

```
@startuml
component comp1 [
This component
has a long comment
on several lines
]
@enduml
```



7.11 Individuelle Farben

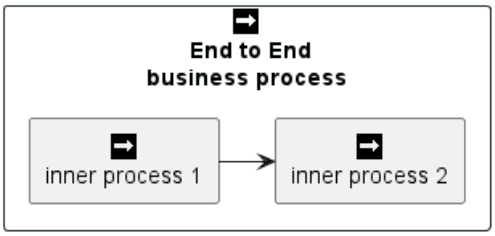
Eine Farbe kann nach der Komponenten Definition angeben werden.

```
@startuml
component  [Web Server] #Yellow
@enduml
```

7.12 Verwendung von Sprites in Stereotypen

Sie können Sprites innerhalb von stereotypen Komponenten verwenden.

```
@startuml
sprite $businessProcess [16x16/16] {
FFFFFFFFFFFFFFFF
FFFFFFFFFFFFFFFF
FFFFFFFFFFFFFFFF
FFFFFFFFFFFFFFFF
FFFFFFFFFF0FFFFF
FFFFFFFFFF00FFFF
FF00000000000FFF
FF0000000000000F
FF00000000000FFF
FFFFFFFFFF00FFFF
FFFFFFFFFF0FFFFF
FFFFFFFFFFFFFFFF
FFFFFFFFFFFFFFFF
FFFFFFFFFFFFFFFF
FFFFFFFFFFFFFFFF
FFFFFFFFFFFFFFFF
}


rectangle " End to End\nbusiness process" <<$businessProcess>> {
 rectangle "inner process 1" <<$businessProcess>> as src
 rectangle "inner process 2" <<$businessProcess>> as tgt
 src -> tgt
}
@enduml
```



7.13 Der Skinparam Befehl

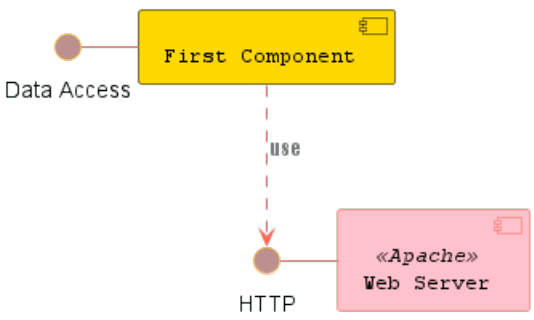
Mit dem skinparam Befehl kann die Farbe und die Schriftart der Zeichnung verändert werden.

Sie können den Befehl auf die folgenden Arten verwenden:

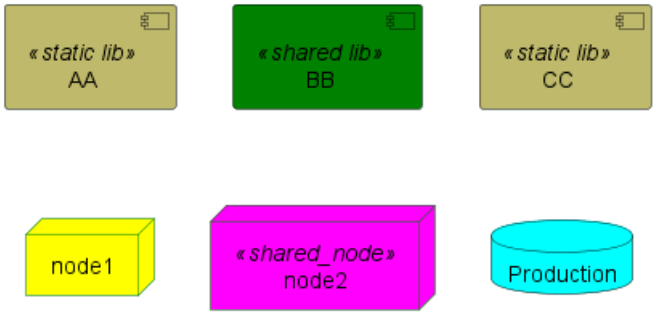
- Wie alle anderen Befehle in einer Diagrammdefinition,
- In einer Include-Datei,
- In einer Konfigurationsdatei, die durch die Kommandozeile oder den ANT-Task übergeben wird.

Es können unterschiedliche Farben und Schriftarten für ”stereotypisierte” Komponenten und Schnittstellen verwendet werden.

```
@startuml

skinparam interface {
  backgroundColor RosyBrown
  borderColor orange
}

skinparam component {
  FontSize 13
  BackgroundColor<<Apache>> Pink
  BorderColor<<Apache>> #FF6655
  FontName Courier
  BorderColor black
  BackgroundColor gold
  ArrowFontName Impact
  ArrowColor #FF6655
  ArrowFontColor #777777
}

() "Data Access" as DA
Component "Web Server" as WS << Apache >>

DA - [First Component]
[First Component] ..> () HTTP : use
HTTP - WS

@enduml
```



```
@startuml

skinparam component {
  backgroundColor<<static lib>> DarkKhaki
  backgroundColor<<shared lib>> Green
}

skinparam node {
  borderColor Green
  backgroundColor Yellow
  backgroundColor<<shared_node>> Magenta
}
skinparam databaseBackgroundColor Aqua

[AA] <<static lib>>
[BB] <<shared lib>>
[CC] <<static lib>>

node node1
node node2 <<shared_node>>
database Production

@enduml
```

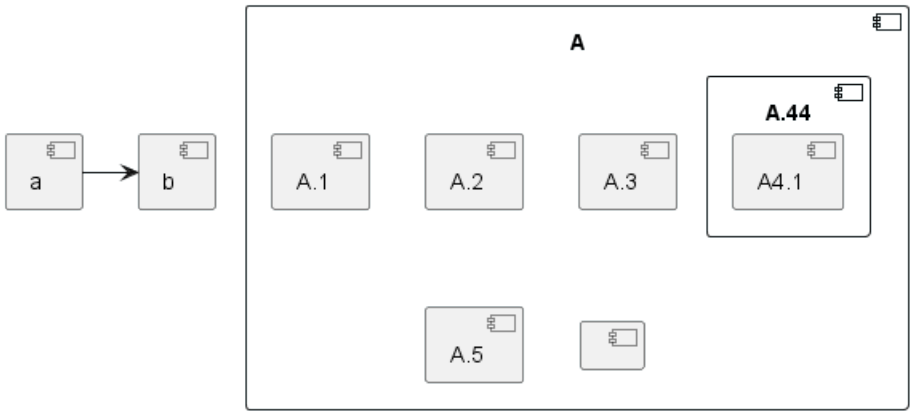


7.14 Specific SkinParameter

7.14.1 componentStyle

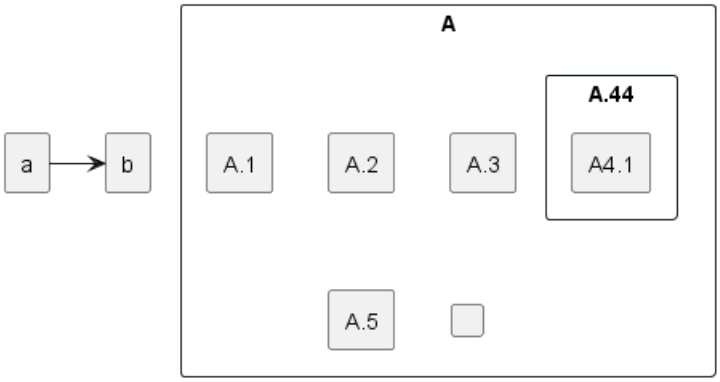
- By default (or with `skinparam componentStyle uml2`), you have an icon for component

```
@startuml
skinparam BackgroundColor transparent
skinparam componentStyle uml2
component A {
   component "A.1" {
}
   component A.44 {
      [A4.1]
}
   component "A.2"
   [A.3]
   component A.5 [
A.5]
   component A.6 [
]
}
[a]->[b]
@enduml
```



- If you want to suppress it, and to have only the rectangle, you can use `skinparam componentStyle rectangle`

```
@startuml
skinparam BackgroundColor transparent
skinparam componentStyle rectangle
component A {
   component "A.1" {
}
   component A.44 {
      [A4.1]
}
   component "A.2"
   [A.3]
   component A.5 [
A.5]
   component A.6 [
]
}
[a]->[b]
@enduml
```



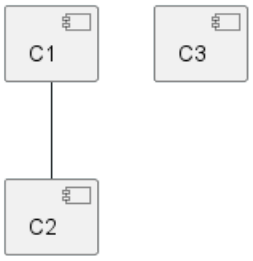
[Ref. 10798]

7.15 Hide or Remove unlinked component

By default, all components are displayed:

```
@startuml
component C1
component C2
component C3
C1 -- C2
```

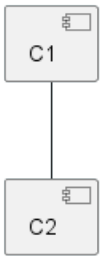
```
@enduml
```



But you can:

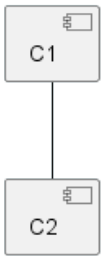
- `hide @unlinked` components:

```
@startuml
component C1
component C2
component C3
C1 -- C2

hide @unlinked
@enduml
```



- or `remove @unlinked` components:

```
@startuml
component C1
component C2
component C3
C1 -- C2

remove @unlinked
@enduml
```



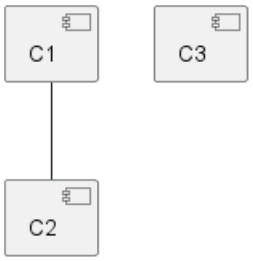
[Ref. QA-11052]

7.16 Hide, Remove or Restore tagged component or wildcard

You can put `$tags` (using `$`) on components, then remove, hide or restore components either individually or by tags.

By default, all components are displayed:

```
@startuml
component C1 $tag13
component C2
component C3 $tag13
C1 -- C2
@enduml
```



But you can:

- `hide $tag13` components:

```
@startuml
component C1 $tag13
component C2
component C3 $tag13
C1 -- C2

hide $tag13
@enduml
```

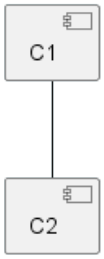
- or `remove $tag13` components:

```
@startuml
component C1 $tag13
component C2
component C3 $tag13
C1 -- C2

remove $tag13
@enduml
```

- or `remove $tag13 and restore $tag1` components:

```
@startuml
component C1 $tag13 $tag1
component C2
component C3 $tag13
C1 -- C2

remove $tag13
```

```
restore $tag1
@enduml
```



- or `remove * and restore $tag1` components:

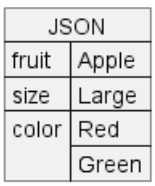
```
@startuml
component C1 $tag13 $tag1
component C2
component C3 $tag13
C1 -- C2

remove *
restore $tag1
@enduml
```

[Ref. QA-7337 and QA-11052]

7.17 Display JSON Data on Component diagram

7.17.1 Simple example

```
@startuml
allowmixing

component Component
()        Interface

json JSON {
   "fruit":"Apple",
   "size":"Large",
   "color": ["Red", "Green"]
}
@enduml
```



[Ref. QA-15481]

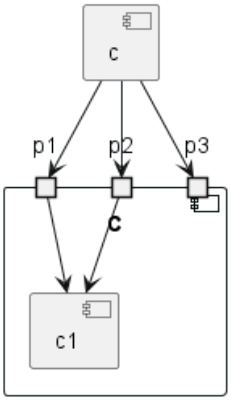
For another example, see on JSON page.

7.18 Port [port, portIn, portOut]

You can add **port** with `port`, `portin`and `portout` keywords.

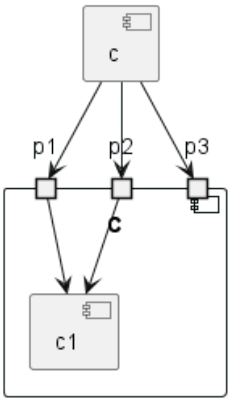
7.18.1 Port

```
@startuml
[c]
component C {
  port p1
  port p2
  port p3
  component c1
}

c --> p1
c --> p2
c --> p3
p1 --> c1
p2 --> c1
@enduml
```



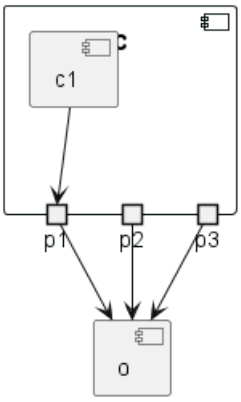
7.18.2 PortIn

```
@startuml
[c]
component C {
  portin p1
  portin p2
  portin p3
  component c1
}

c --> p1
c --> p2
c --> p3
p1 --> c1
p2 --> c1
@enduml
```



7.18.3 PortOut

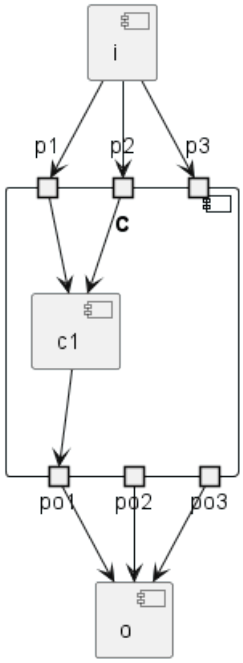
```
@startuml
component C {
  portout p1
  portout p2
  portout p3
  component c1
}
[o]
p1 --> o
p2 --> o
p3 --> o
c1 --> p1
@enduml
```



7.18.4 Mixing PortIn & PortOut

```
@startuml
[i]
component C {
  portin p1
  portin p2
  portin p3
  portout po1
  portout po2
  portout po3
  component c1
}
[o]

i --> p1
```

```
i --> p2
i --> p3
p1 --> c1
p2 --> c1
po1 --> o
po2 --> o
po3 --> o
c1 --> po1
@enduml
```



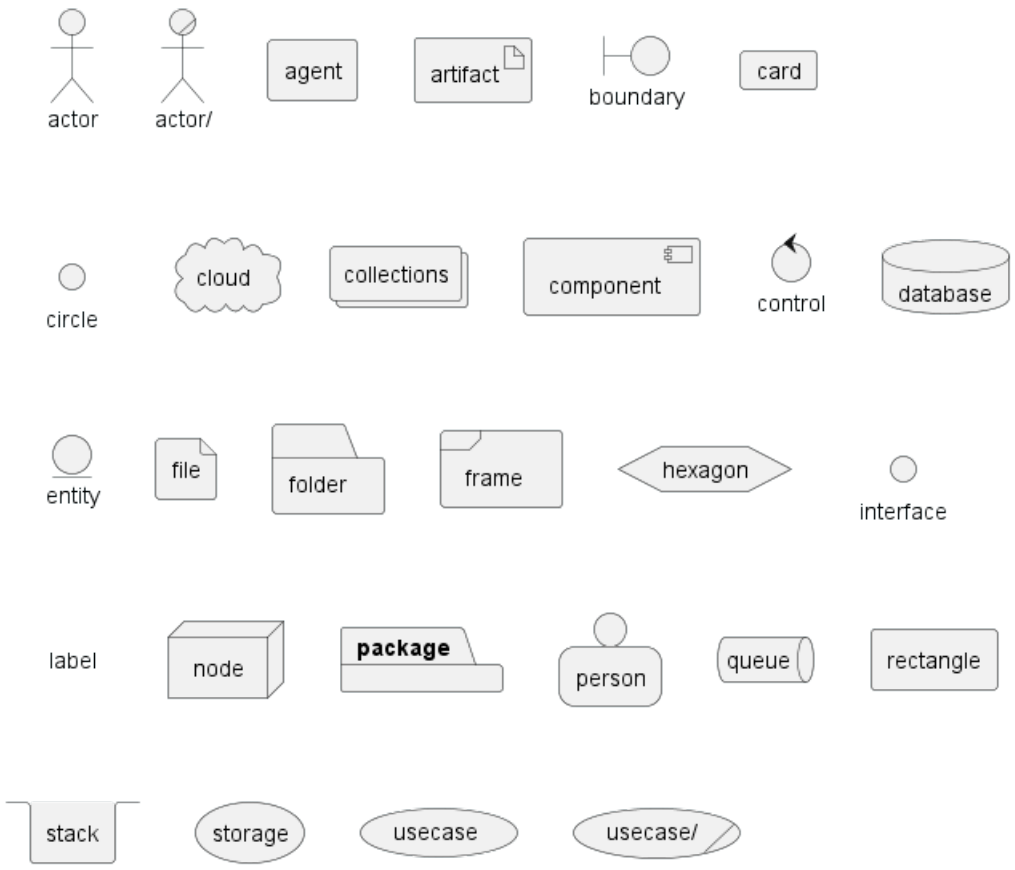
8 Deployment Diagram

A **Deployment Diagram** is a type of diagram that visualizes the architecture of systems, showcasing how software components are deployed onto hardware. It provides a clear picture of the distribution of components across various nodes, such as servers, workstations, and devices.

With PlantUML, creating deployment diagrams becomes a breeze. The platform offers a simple and intuitive way to design these diagrams using plain text, ensuring rapid iterations and easy version control. Moreover, the PlantUML forum provides a vibrant community where users can seek help, share ideas, and collaborate on diagramming challenges. One of the key advantages of PlantUML is its ability to integrate seamlessly with various tools and platforms, making it a preferred choice for professionals and enthusiasts alike.

8.1 Element deklarieren

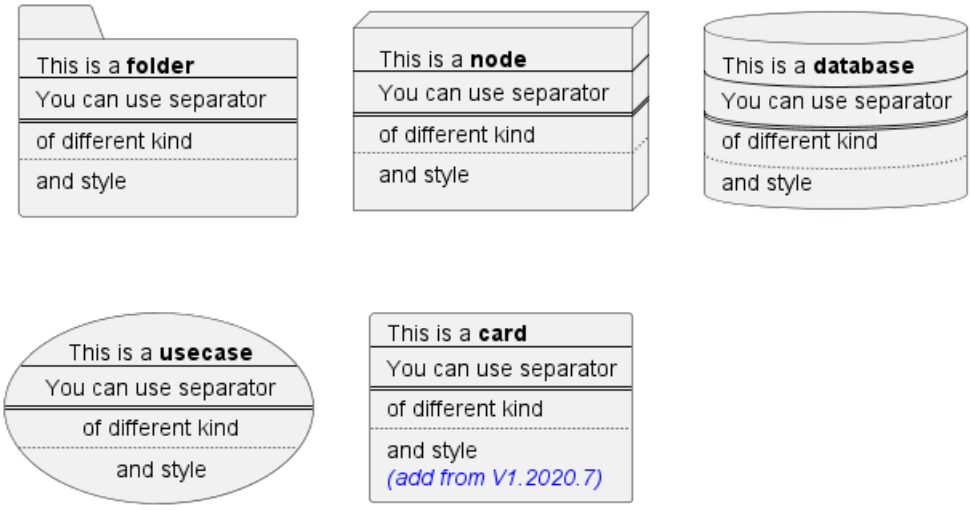
```
@startuml
actor actor
actor/ "actor/"
agent agent
artifact artifact
boundary boundary
card card
circle circle
cloud cloud
collections collections
component component
control control
database database
entity entity
file file
folder folder
frame frame
hexagon hexagon
interface interface
label label
node node
package package
person person
queue queue
rectangle rectangle
stack stack
storage storage
usecase usecase
usecase/ "usecase/"
@enduml
```



Für eine lange Beschreibung können Sie optional Text in Klammern `[]` eingeben.

```
@startuml
folder folder [
This is a <b>folder
----
You can use separator
====
of different kind
....
and style
]

node node [
This is a <b>node
----
You can use separator
====
of different kind
....
and style
]

database database [
This is a <b>database
----
You can use separator
====
of different kind
....
and style
```

```
]

usecase usecase [
This is a <b>usecase
----
You can use separator
====
of different kind
....
and style
]

card card [
This is a <b>card
----
You can use separator
====
of different kind
....
and style
<i><color:blue>(add from V1.2020.7)</color></i>
]
@enduml
```



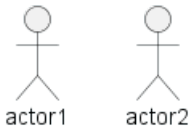
8.2 Declaring element (using short form)

We can declare element using some short forms.

Long form Keyword	Short form Keyword	Long form example	Short form example	Ref.
actor	: *a* :	actor actor1	:actor2:	Actors
component	[*c*]	component component1	[component2]	Components
interface	() *i*	interface interface1	() "interface2"	Interfaces
usecase	(*u*)	usecase usecase1	(usecase2)	Usecases

8.2.1 Actor

```
@startuml

actor actor1
:actor2:

@enduml
```



NB: *There is an old syntax for actor with guillemet which is now deprecated and will be removed some days. Please do not use in your diagram.*

8.2.2 Component

```
@startuml

component component1
[component2]

@enduml
```

8.2.3 Interface

```
@startuml

interface interface1
() "interface2"

label "//interface example//"
@enduml
```

interface example

8.2.4 Usecase

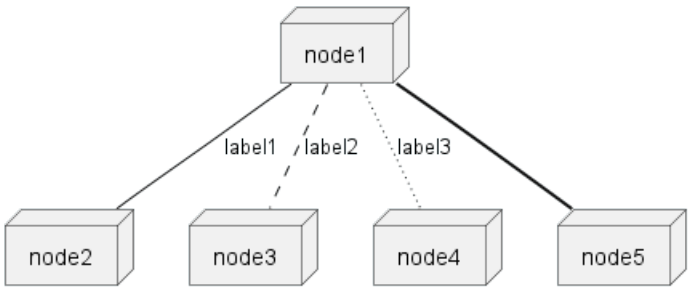
```
@startuml

usecase usecase1
(usecase2)

@enduml
```

8.3 Linking or arrow

You can create simple links between elements with or without labels:

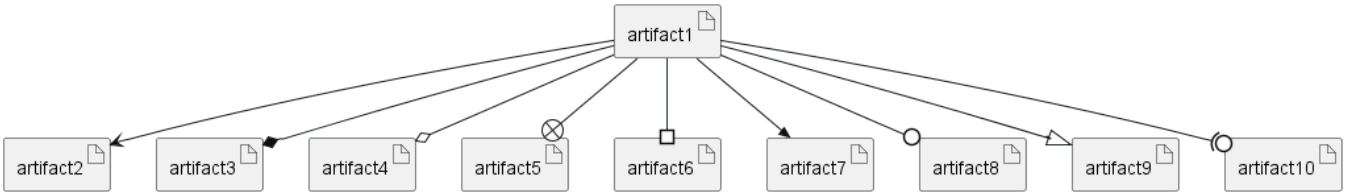
```
@startuml

node node1
node node2
node node3
node node4
```

```
node node5
node1 -- node2 : label1
node1 .. node3 : label2
node1 ~~ node4 : label3
node1 == node5

@enduml
```



It is possible to use several types of links:

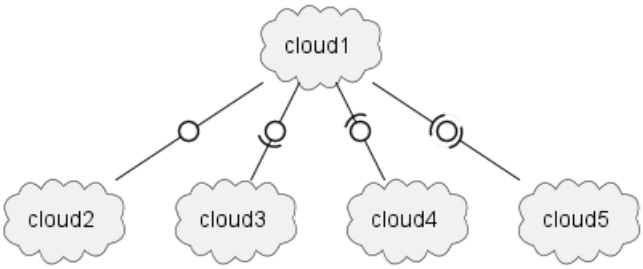
```
@startuml

artifact artifact1
artifact artifact2
artifact artifact3
artifact artifact4
artifact artifact5
artifact artifact6
artifact artifact7
artifact artifact8
artifact artifact9
artifact artifact10
artifact1 --> artifact2
artifact1 --* artifact3
artifact1 --o artifact4
artifact1 --+ artifact5
artifact1 --# artifact6
artifact1 -->> artifact7
artifact1 --0 artifact8
artifact1 --^ artifact9
artifact1 --(0 artifact10

@enduml
```



You can also have the following types:

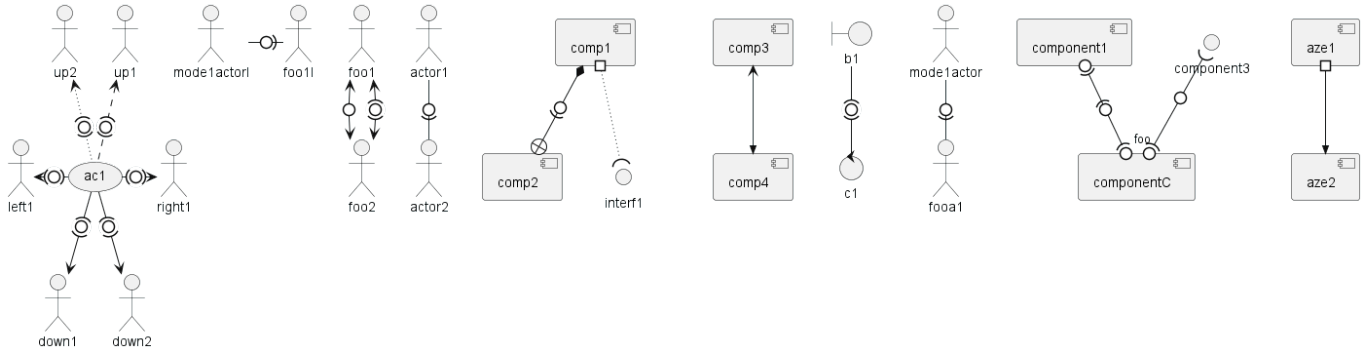
```
@startuml

cloud cloud1
cloud cloud2
cloud cloud3
cloud cloud4
```

```
cloud cloud5
cloud1 -0- cloud2
cloud1 -0)- cloud3
cloud1 -(0- cloud4
cloud1 -(0)- cloud5

@enduml
```



or another example:

```
@startuml
actor foo1
actor foo2
foo1 <-0-> foo2
foo1 <-(0)-> foo2

(ac1) -le(0)-> left1
ac1 -ri(0)-> right1
ac1 .up(0).> up1
ac1 ~up(0)~> up2
ac1 -do(0)-> down1
ac1 -do(0)-> down2

actor1 -0)- actor2

component comp1
component comp2
comp1 *-0)-+ comp2
[comp3] <-->> [comp4]

boundary b1
control c1
b1 -(0)- c1

component comp1
interface interf1
comp1 #~~( interf1

:mode1actor: -0)- fooa1
:mode1actorl: -ri0)- foo1l

[component1] 0)-(0-(0 [componentC]
() component3 )-0-(0 "foo" [componentC]

[aze1] #-->> [aze2]
@enduml
```



[Ref. QA-547 and QA-1736]

See all type on **Appendix**.

8.4 Bracketed arrow style

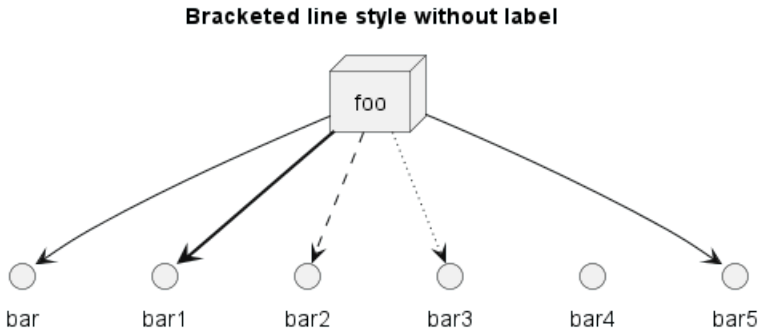
*Similar as Bracketed **class** relations (linking or arrow) style*

8.4.1 Line style

It's also possible to have explicitly `bold`, `dashed`, `dotted`, `hidden` or `plain` arrows:

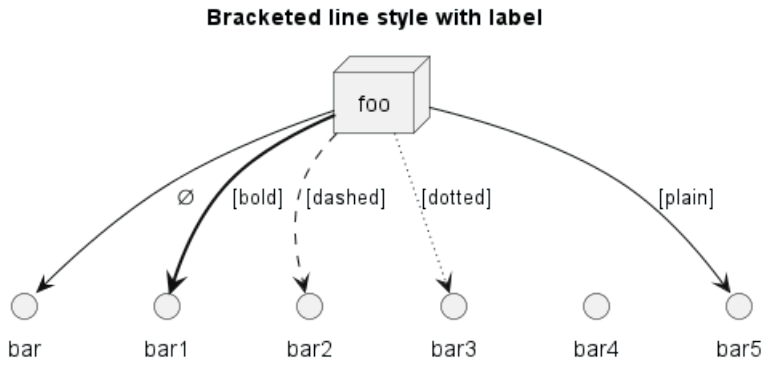
- without label

```
@startuml
node foo
title Bracketed line style without label
foo --> bar
foo -[bold]-> bar1
foo -[dashed]-> bar2
foo -[dotted]-> bar3
foo -[hidden]-> bar4
foo -[plain]-> bar5
@enduml
```



- with label

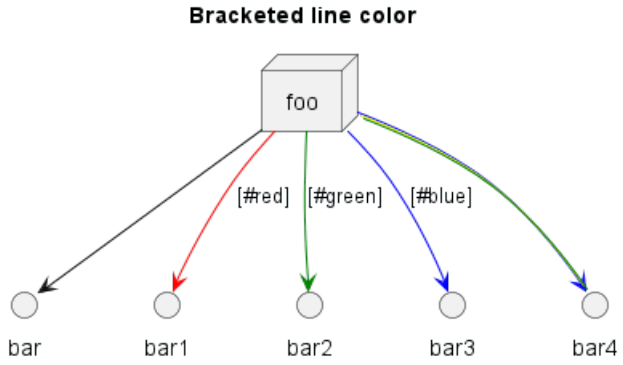
```
@startuml
title Bracketed line style with label
node foo
foo --> bar          :
foo -[bold]-> bar1   : [bold]
foo -[dashed]-> bar2 : [dashed]
foo -[dotted]-> bar3 : [dotted]
foo -[hidden]-> bar4 : [hidden]
foo -[plain]-> bar5  : [plain]
@enduml
```



[Adapted from QA-4181]

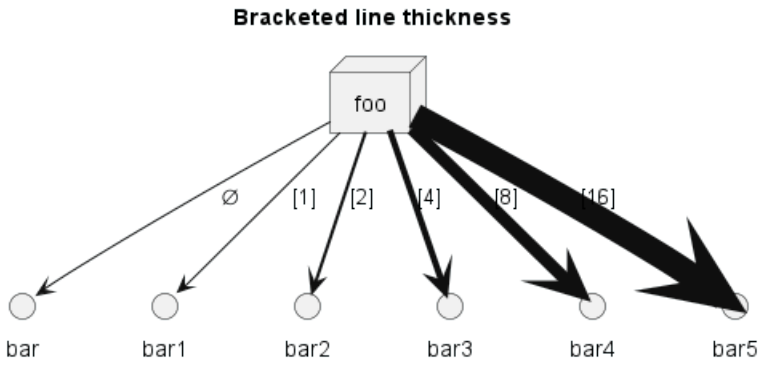
8.4.2 Line color

```
@startuml
title Bracketed line color
node  foo
foo --> bar
foo -[#red]-> bar1     : [#red]
foo -[#green]-> bar2   : [#green]
foo -[#blue]-> bar3    : [#blue]
foo -[#blue;#yellow;#green]-> bar4
@enduml
```



8.4.3 Line thickness

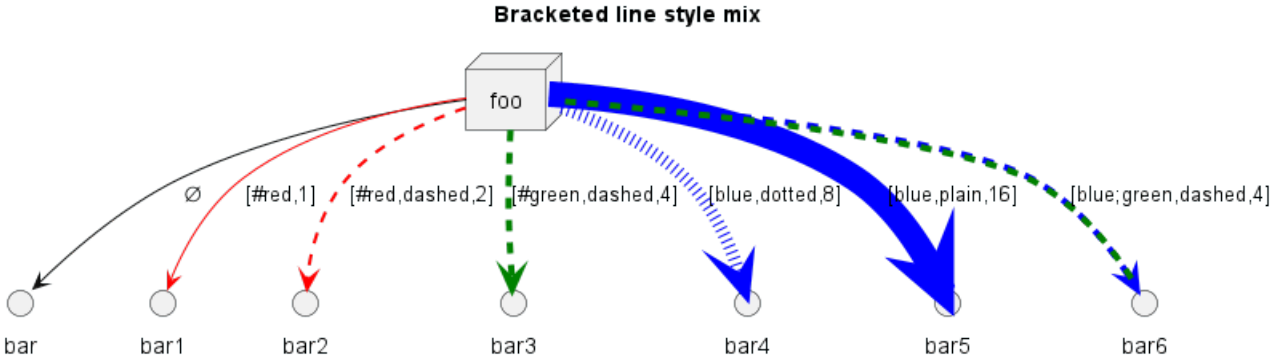
```
@startuml
title Bracketed line thickness
node foo
foo --> bar                 :
foo -[thickness=1]-> bar1   : [1]
foo -[thickness=2]-> bar2   : [2]
foo -[thickness=4]-> bar3   : [4]
foo -[thickness=8]-> bar4   : [8]
foo -[thickness=16]-> bar5  : [16]
@enduml
```



[Adapted from QA-4949]

8.4.4 Mix

```
@startuml
title Bracketed line style mix
node foo
foo --> bar                              :
foo -[#red,thickness=1]-> bar1           : [#red,1]
foo -[#red,dashed,thickness=2]-> bar2    : [#red,dashed,2]
foo -[#green,dashed,thickness=4]-> bar3 : [#green,dashed,4]
foo -[#blue,dotted,thickness=8]-> bar4   : [blue,dotted,8]
foo -[#blue,plain,thickness=16]-> bar5   : [blue,plain,16]
foo -[#blue;#green,dashed,thickness=4]-> bar6   : [blue;green,dashed,4]
@enduml
```

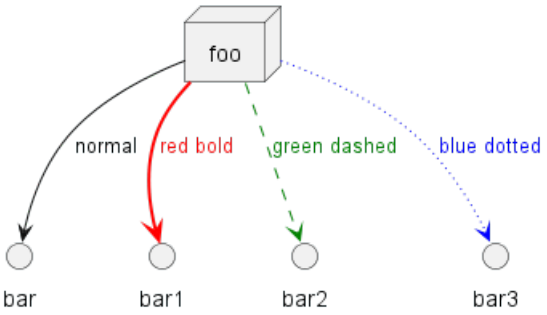


8.5 Change arrow color and style (inline style)

You can change the color or style of individual arrows using the inline following notation:

- `#color;line.[bold|dashed|dotted];text:color`

```
@startuml
node foo
foo --> bar : normal
foo --> bar1 #line:red;line.bold;text:red  : red bold
foo --> bar2 #green;line.dashed;text:green : green dashed
foo --> bar3 #blue;line.dotted;text:blue   : blue dotted
@enduml
```



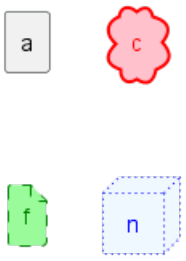
[Ref. QA-3770 and QA-3816] [See similar feature on class diagram]

8.6 Change element color and style (inline style)

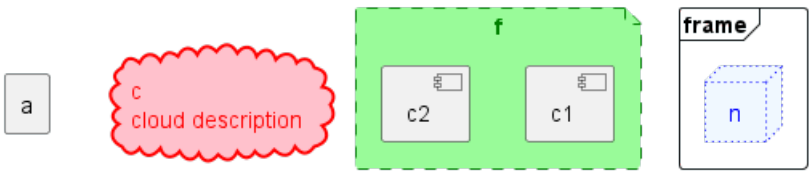
You can change the color or style of individual element using the following notation:

- `#[color|back:color];line:color;line.[bold|dashed|dotted];text:color`

```
@startuml
agent a
cloud c #pink;line:red;line.bold;text:red
file  f #palegreen;line:green;line.dashed;text:green
node  n #aliceblue;line:blue;line.dotted;text:blue
@enduml
```




```
@startuml
agent a
cloud c #pink;line:red;line.bold;text:red [
c
cloud description
]
file  f #palegreen;line:green;line.dashed;text:green {
[c1]
[c2]
}
frame frame {
node  n #aliceblue;line:blue;line.dotted;text:blue
}
@enduml
```



[Ref. QA-6852]

8.7 Nestable elements

Here are the nestable elements:

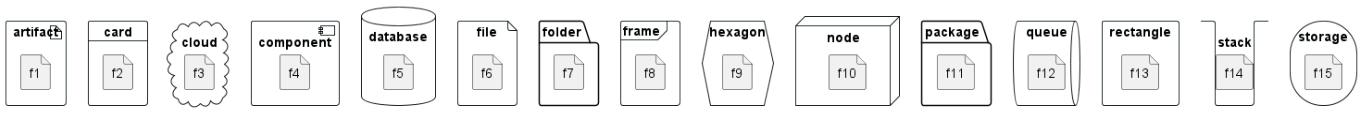
```
@startuml
artifact artifact {
}
card card {
}
cloud cloud {
}
component component {
}
database database {
}
file file {
}
folder folder {
}
frame frame {
}
hexagon hexagon {
}
node node {
}
package package {
}
queue queue {
}
rectangle rectangle {
}
stack stack {
}
storage storage {
}
@enduml
```

8.8 Packages and nested elements

8.8.1 Example with one level

```
@startuml
artifact    artifactVeryLOOOOOOOOOOOOOOOOOOg    as "artifact" {
file f1
}
card        cardVeryLOOOOOOOOOOOOOOOOOOg        as "card" {
file f2
}
cloud       cloudVeryLOOOOOOOOOOOOOOOOOOg       as "cloud" {
file f3
}
component   componentVeryLOOOOOOOOOOOOOOOOOOg   as "component" {
file f4
}
database    databaseVeryLOOOOOOOOOOOOOOOOOOg    as "database" {
file f5
```

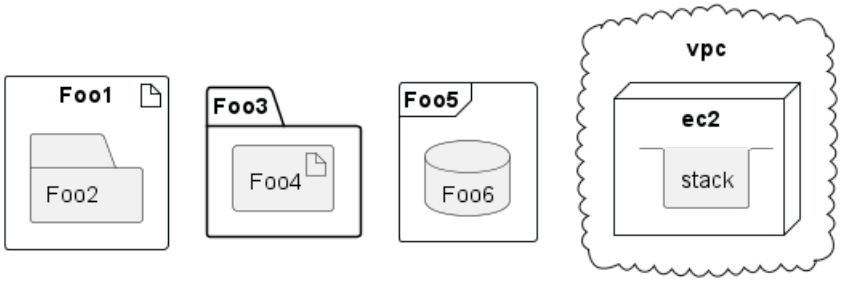
```
}
file        fileVeryLOOOOOOOOOOOOOOOOOOg        as "file" {
file f6
}
folder      folderVeryLOOOOOOOOOOOOOOOOOOg      as "folder" {
file f7
}
frame       frameVeryLOOOOOOOOOOOOOOOOOOg       as "frame" {
file f8
}
hexagon     hexagonVeryLOOOOOOOOOOOOOOOOOOg     as "hexagon" {
file f9
}
node        nodeVeryLOOOOOOOOOOOOOOOOOOg        as "node" {
file f10
}
package     packageVeryLOOOOOOOOOOOOOOOOOOg     as "package" {
file f11
}
queue       queueVeryLOOOOOOOOOOOOOOOOOOg       as "queue" {
file f12
}
rectangle   rectangleVeryLOOOOOOOOOOOOOOOOOOg   as "rectangle" {
file f13
}
stack       stackVeryLOOOOOOOOOOOOOOOOOOg       as "stack" {
file f14
}
storage     storageVeryLOOOOOOOOOOOOOOOOOOg     as "storage" {
file f15
}
@enduml
```



8.8.2 Other example

```
@startuml
artifact Foo1 {
  folder Foo2
}

folder Foo3 {
  artifact Foo4
}

frame Foo5 {
  database Foo6
}

cloud vpc {
  node ec2 {
    stack stack
  }
}
```

```
@enduml
```




```
@startuml
node Foo1 {
 cloud Foo2
}

cloud Foo3 {
  frame Foo4
}

database Foo5  {
  storage Foo6
}

storage Foo7 {
  storage Foo8
}
@enduml
```

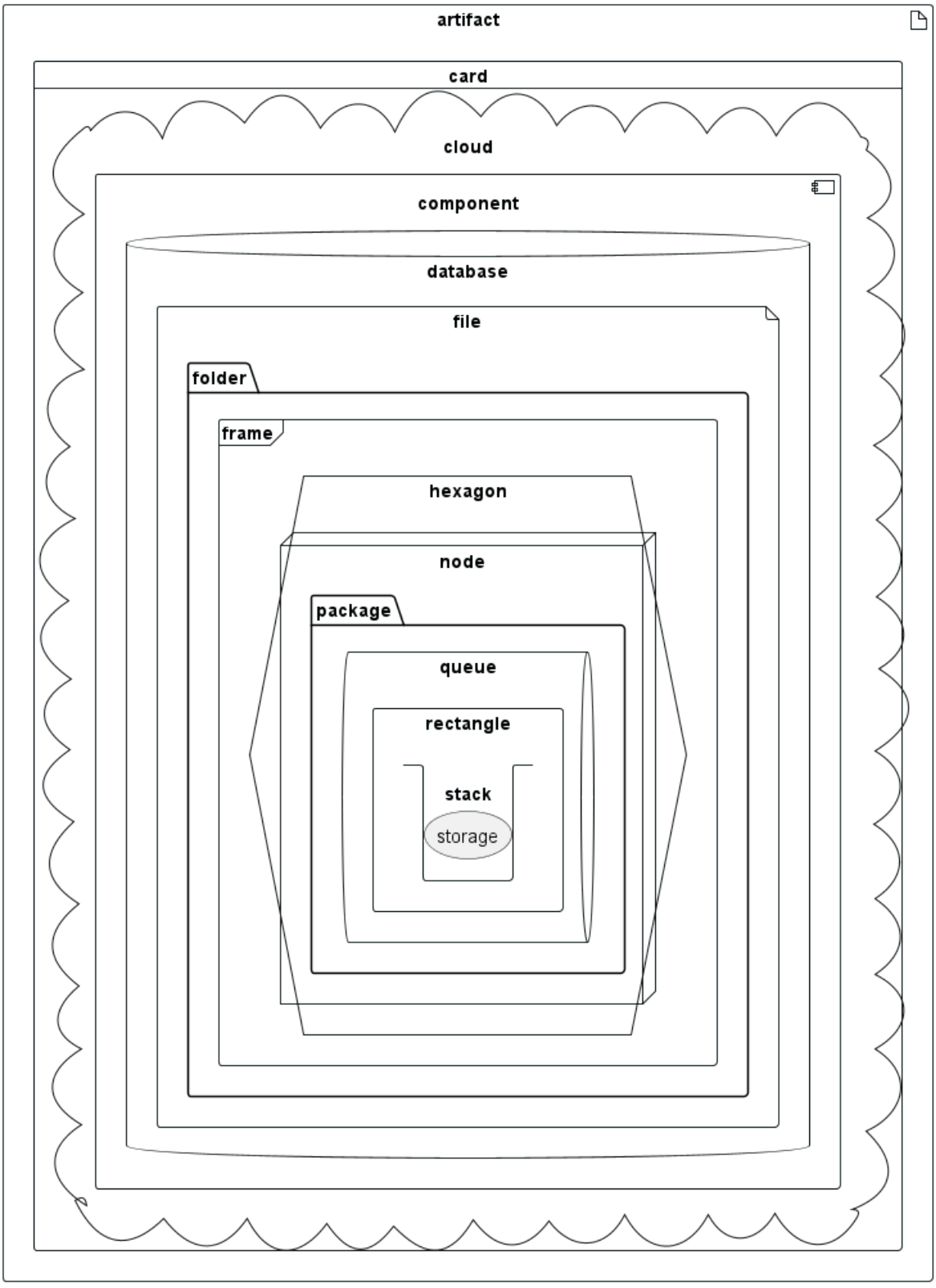
8.8.3 Full nesting

Here is all the nested elements:

- by alphabetical order:

```
@startuml
artifact artifact {
card card {
cloud cloud {
component component {
database database {
file file {
folder folder {
frame frame {
hexagon hexagon {
node node {
package package {
queue queue {
rectangle rectangle {
stack stack {
storage storage {
```

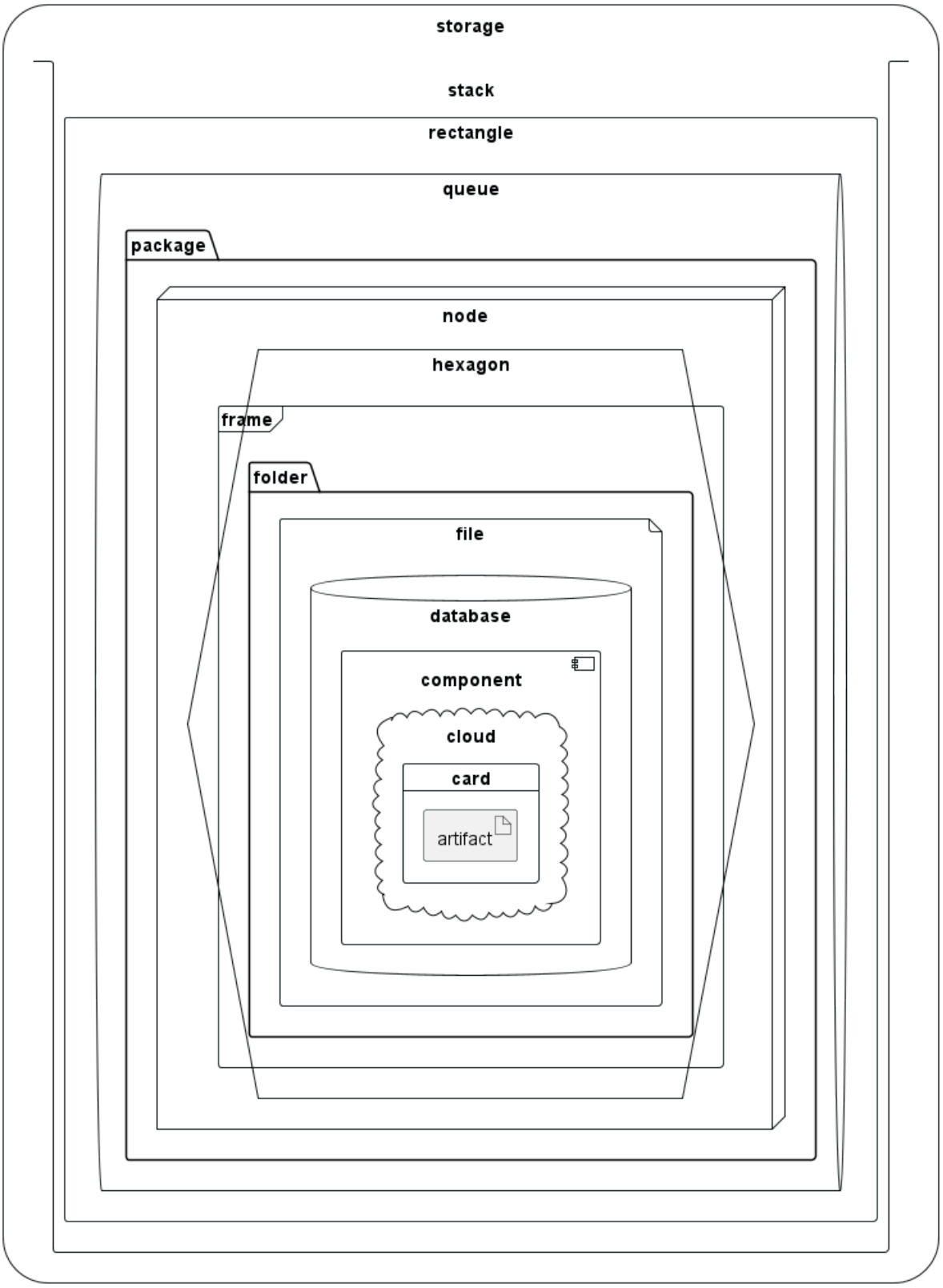
```
}
}
}
}
}
}
}
}
}
}
}
}
}
}
@enduml
```



- or reverse alphabetical order

```
@startuml
storage storage {
stack stack {
rectangle rectangle {
queue queue {
package package {
```

```
node node {
hexagon hexagon {
frame frame {
folder folder {
file file {
database database {
component component {
cloud cloud {
card card {
artifact artifact {
}
}
}
}
}
}
}
}
}
}
}
}
}
@enduml
```

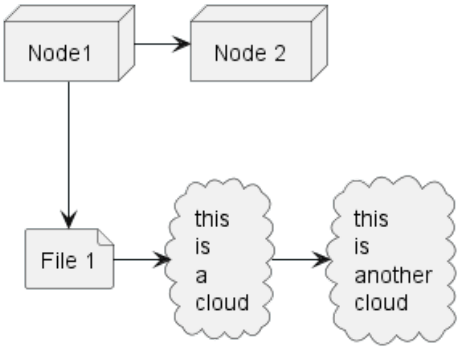


8.9 Alias

8.9.1 Simple alias with as

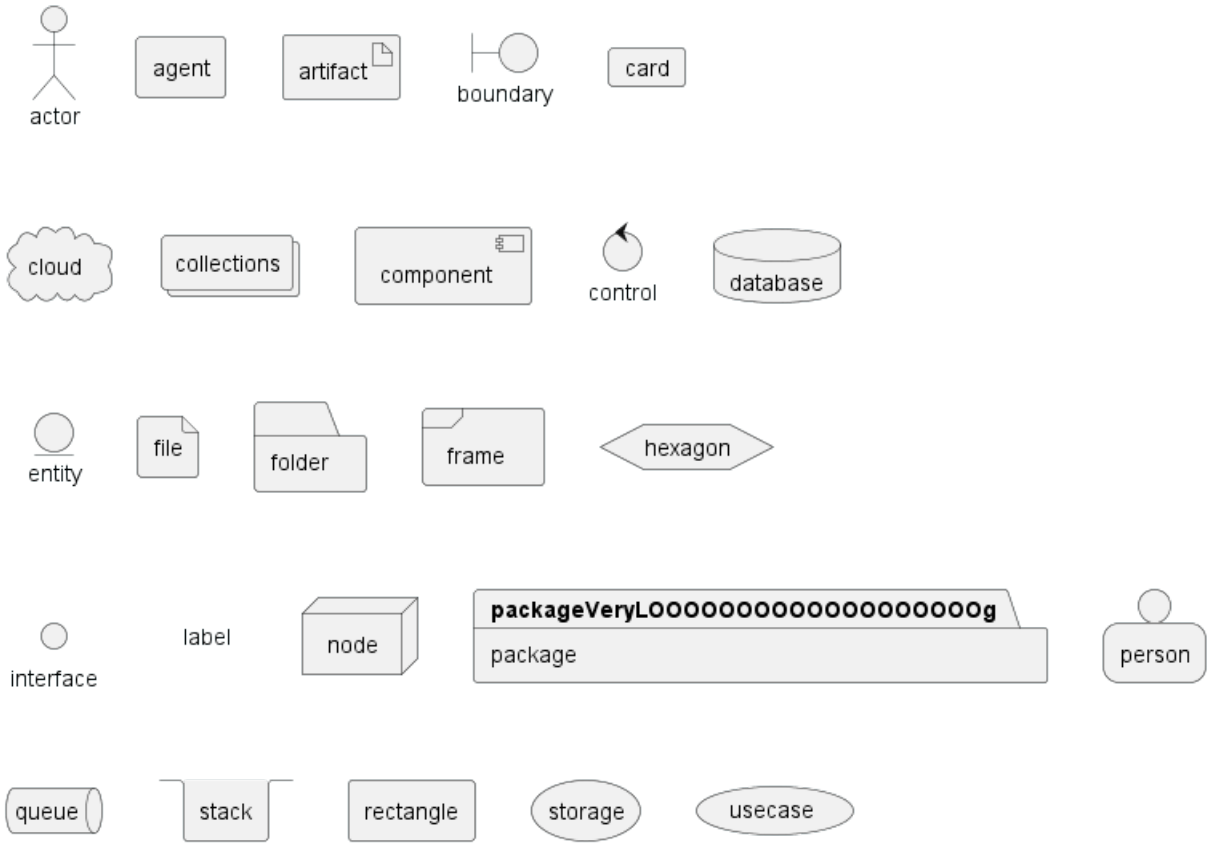
```
@startuml
node Node1 as n1
node "Node 2" as n2
```

```
file f1 as "File 1"
cloud c1 as "this
is
a
cloud"
cloud c2 [this
is
another
cloud]

n1 -> n2
n1 --> f1
f1 -> c1
c1 -> c2
@enduml
```

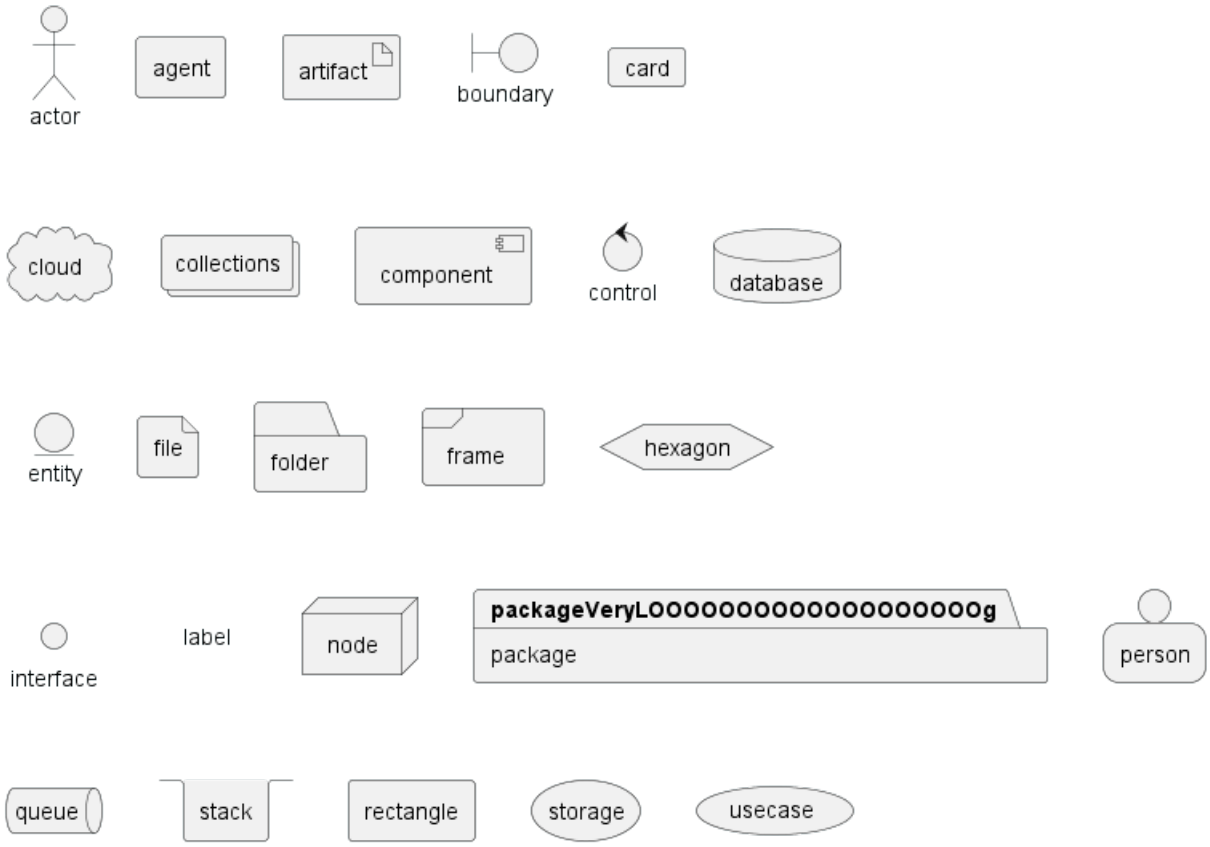


8.9.2 Examples of long alias

```
@startuml
actor        "actor"       as actorVeryLOOOOOOOOOOOOOOOOOOg
agent        "agent"       as agentVeryLOOOOOOOOOOOOOOOOOOg
artifact     "artifact"    as artifactVeryLOOOOOOOOOOOOOOOOOOg
boundary     "boundary"    as boundaryVeryLOOOOOOOOOOOOOOOOOOg
card         "card"        as cardVeryLOOOOOOOOOOOOOOOOOOg
cloud        "cloud"       as cloudVeryLOOOOOOOOOOOOOOOOOOg
collections  "collections" as collectionsVeryLOOOOOOOOOOOOOOOOOOg
component    "component"   as componentVeryLOOOOOOOOOOOOOOOOOOg
control      "control"     as controlVeryLOOOOOOOOOOOOOOOOOOg
database     "database"    as databaseVeryLOOOOOOOOOOOOOOOOOOg
entity       "entity"      as entityVeryLOOOOOOOOOOOOOOOOOOg
file         "file"        as fileVeryLOOOOOOOOOOOOOOOOOOg
folder       "folder"      as folderVeryLOOOOOOOOOOOOOOOOOOg
frame        "frame"       as frameVeryLOOOOOOOOOOOOOOOOOOg
hexagon      "hexagon"     as hexagonVeryLOOOOOOOOOOOOOOOOOOg
interface    "interface"   as interfaceVeryLOOOOOOOOOOOOOOOOOOg
label        "label"       as labelVeryLOOOOOOOOOOOOOOOOOOg
node         "node"        as nodeVeryLOOOOOOOOOOOOOOOOOOg
package      "package"     as packageVeryLOOOOOOOOOOOOOOOOOOg
person       "person"      as personVeryLOOOOOOOOOOOOOOOOOOg
queue        "queue"       as queueVeryLOOOOOOOOOOOOOOOOOOg
stack        "stack"       as stackVeryLOOOOOOOOOOOOOOOOOOg
rectangle    "rectangle"   as rectangleVeryLOOOOOOOOOOOOOOOOOOg
storage      "storage"     as storageVeryLOOOOOOOOOOOOOOOOOOg
usecase      "usecase"     as usecaseVeryLOOOOOOOOOOOOOOOOOOg
@enduml
```



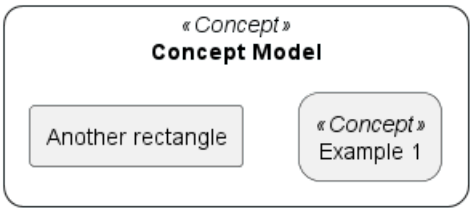

```
@startuml
actor       actorVeryLOOOOOOOOOOOOOOOOOOg       as "actor"
agent       agentVeryLOOOOOOOOOOOOOOOOOOg       as "agent"
artifact    artifactVeryLOOOOOOOOOOOOOOOOOOg    as "artifact"
boundary    boundaryVeryLOOOOOOOOOOOOOOOOOOg    as "boundary"
card        cardVeryLOOOOOOOOOOOOOOOOOOg        as "card"
cloud       cloudVeryLOOOOOOOOOOOOOOOOOOg       as "cloud"
collections collectionsVeryLOOOOOOOOOOOOOOOOOOg as "collections"
component   componentVeryLOOOOOOOOOOOOOOOOOOg   as "component"
control     controlVeryLOOOOOOOOOOOOOOOOOOg     as "control"
database    databaseVeryLOOOOOOOOOOOOOOOOOOg    as "database"
entity      entityVeryLOOOOOOOOOOOOOOOOOOg      as "entity"
file        fileVeryLOOOOOOOOOOOOOOOOOOg        as "file"
folder      folderVeryLOOOOOOOOOOOOOOOOOOg      as "folder"
frame       frameVeryLOOOOOOOOOOOOOOOOOOg       as "frame"
hexagon     hexagonVeryLOOOOOOOOOOOOOOOOOOg     as "hexagon"
interface   interfaceVeryLOOOOOOOOOOOOOOOOOOg   as "interface"
label       labelVeryLOOOOOOOOOOOOOOOOOOg       as "label"
node        nodeVeryLOOOOOOOOOOOOOOOOOOg        as "node"
package     packageVeryLOOOOOOOOOOOOOOOOOOg     as "package"
person      personVeryLOOOOOOOOOOOOOOOOOOg      as "person"
queue       queueVeryLOOOOOOOOOOOOOOOOOOg       as "queue"
stack       stackVeryLOOOOOOOOOOOOOOOOOOg       as "stack"
rectangle   rectangleVeryLOOOOOOOOOOOOOOOOOOg   as "rectangle"
storage     storageVeryLOOOOOOOOOOOOOOOOOOg     as "storage"
usecase     usecaseVeryLOOOOOOOOOOOOOOOOOOg     as "usecase"
@enduml
```



[Ref. QA-12082]

8.10 Round corner

```
@startuml
skinparam rectangle {
    roundCorner<<Concept>> 25
}

rectangle "Concept Model" <<Concept>> {
rectangle "Example 1" <<Concept>> as ex1
rectangle "Another rectangle"
}
@enduml
```

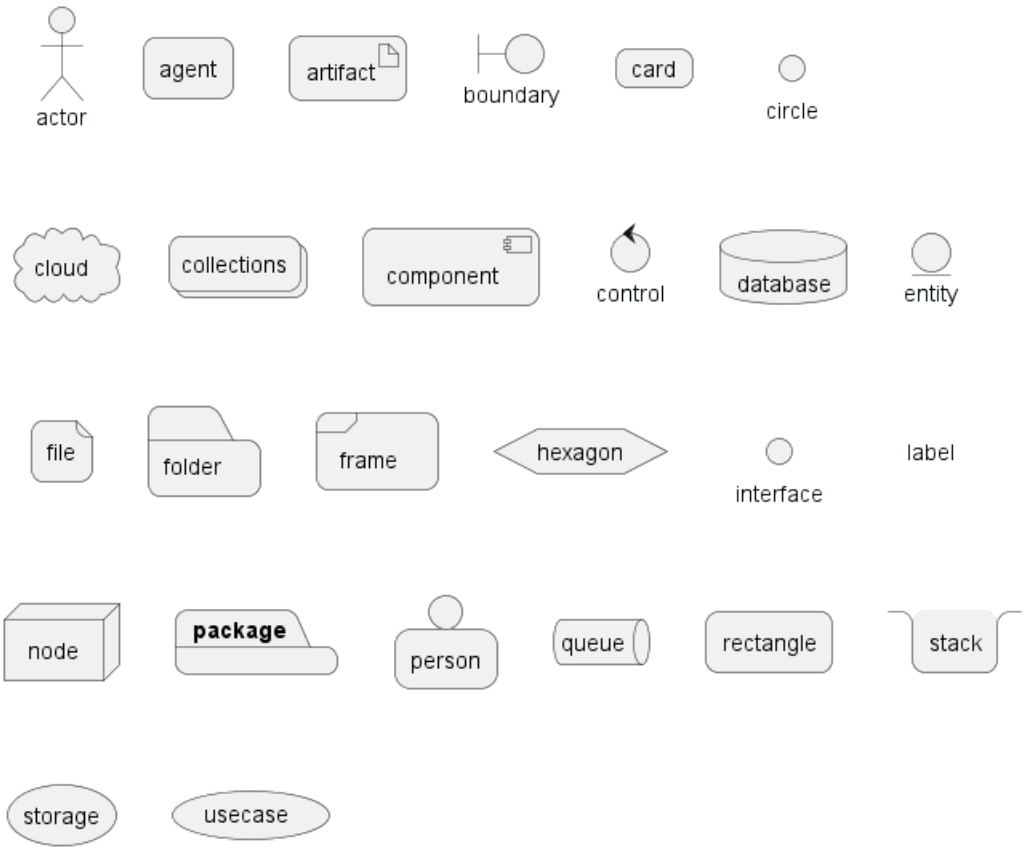


8.11 Specific SkinParameter

8.11.1 roundCorner

```
@startuml
skinparam roundCorner 15
actor actor
agent agent
artifact artifact
```

```
boundary boundary
card card
circle circle
cloud cloud
collections collections
component component
control control
database database
entity entity
file file
folder folder
frame frame
hexagon hexagon
interface interface
label label
node node
package package
person person
queue queue
rectangle rectangle
stack stack
storage storage
usecase usecase
@enduml
```

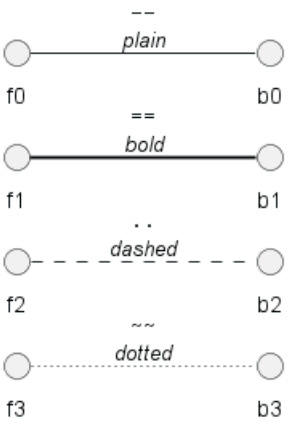


[Ref. QA-5299, QA-6915, QA-11943]

8.12 Appendix: All type of arrow line

```
@startuml
left to right direction
skinparam nodesep 5
```

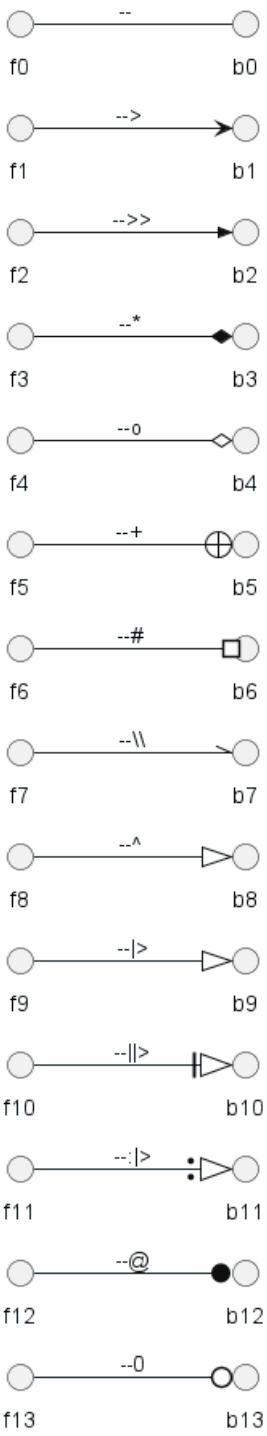
```
f3  ~~  b3  : ""~~""\n//dotted//
f2  ..  b2  : ""..""\n//dashed//
f1  ==  b1  : ""==""\n//bold//
f0  --  b0  : ""--""\n//plain//
@enduml
```



8.13 Appendix: All type of arrow head or ’0’ arrow

8.13.1 Type of arrow head

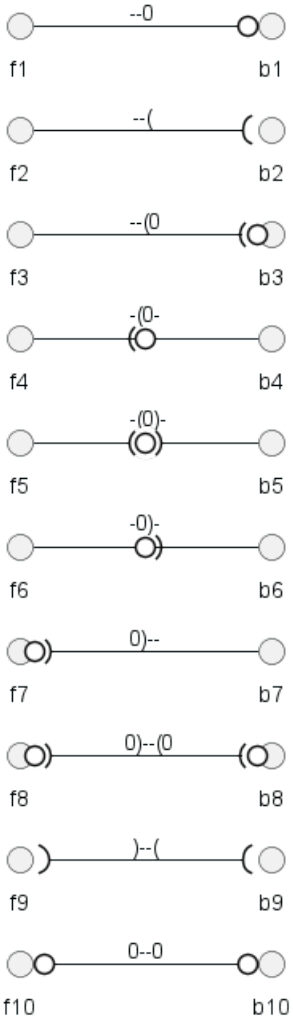
```
@startuml
left to right direction
skinparam nodesep 5

f13 --0   b13 : ""--0""
f12 --@   b12 : ""--@""
f11 --:|> b11 : ""--:|>""
f10 --||> b10 : ""--||>""
f9  --|>  b9  : ""--|>""
f8  --^   b8  : ""--^ ""
f7  --\\  b7  : ""--\\\\""
f6  --#   b6  : ""--# ""
f5  --+   b5  : ""--+ ""
f4  --o   b4  : ""--o ""
f3  --*   b3  : ""--* ""
f2  -->>  b2  : ""-->>""
f1  -->   b1  : ""--> ""
f0  --    b0  : ""--  ""
@enduml
```



8.13.2 Type of '0' arrow or circle arrow

```
@startuml
left to right direction
skinparam nodesep 5

f10 0--0 b10 : "" 0--0 ""
f9 )--(  b9  : "" )--( ""
f8 0)--(0 b8 : "" 0)--(0""
f7 0)--  b7  : "" 0)-- ""
f6 -0)-  b6  : "" -0)- ""
f5 -(0)- b5  : "" -(0)-""
```

```
f4 -(0-  b4  : "" -(0- ""
f3 --(0  b3  : "" --(0 ""
f2 --(   b2  : "" --(  ""
f1 --0   b1  : "" --0  ""
@enduml
```

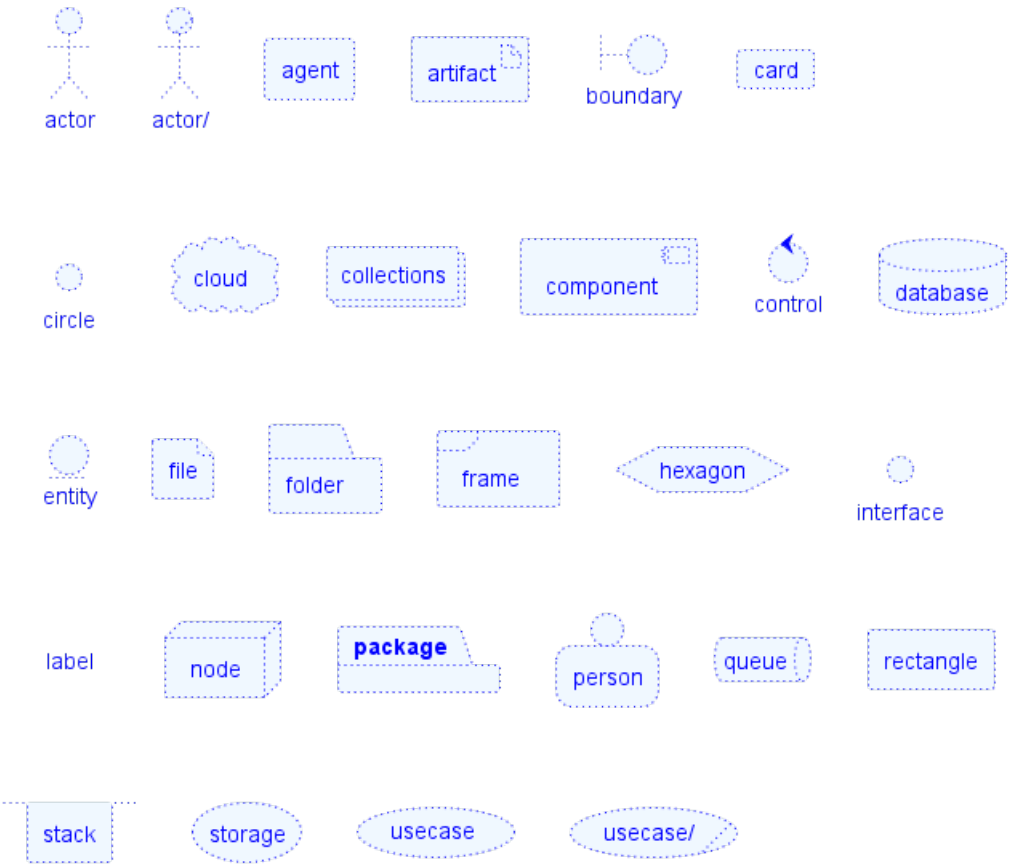


8.14 Appendix: Test of inline style on all element

8.14.1 Simple element

```
@startuml
actor actor             #aliceblue;line:blue;line.dotted;text:blue
actor/ "actor/"         #aliceblue;line:blue;line.dotted;text:blue
agent agent             #aliceblue;line:blue;line.dotted;text:blue
artifact artifact       #aliceblue;line:blue;line.dotted;text:blue
boundary boundary       #aliceblue;line:blue;line.dotted;text:blue
card card               #aliceblue;line:blue;line.dotted;text:blue
circle circle           #aliceblue;line:blue;line.dotted;text:blue
cloud cloud             #aliceblue;line:blue;line.dotted;text:blue
collections collections #aliceblue;line:blue;line.dotted;text:blue
component component     #aliceblue;line:blue;line.dotted;text:blue
control control         #aliceblue;line:blue;line.dotted;text:blue
database database       #aliceblue;line:blue;line.dotted;text:blue
entity entity           #aliceblue;line:blue;line.dotted;text:blue
file file               #aliceblue;line:blue;line.dotted;text:blue
folder folder           #aliceblue;line:blue;line.dotted;text:blue
```

```
frame frame             #aliceblue;line:blue;line.dotted;text:blue
hexagon hexagon         #aliceblue;line:blue;line.dotted;text:blue
interface interface     #aliceblue;line:blue;line.dotted;text:blue
label label             #aliceblue;line:blue;line.dotted;text:blue
node node               #aliceblue;line:blue;line.dotted;text:blue
package package         #aliceblue;line:blue;line.dotted;text:blue
person person           #aliceblue;line:blue;line.dotted;text:blue
queue queue             #aliceblue;line:blue;line.dotted;text:blue
rectangle rectangle     #aliceblue;line:blue;line.dotted;text:blue
stack stack             #aliceblue;line:blue;line.dotted;text:blue
storage storage         #aliceblue;line:blue;line.dotted;text:blue
usecase usecase         #aliceblue;line:blue;line.dotted;text:blue
usecase/ "usecase/"     #aliceblue;line:blue;line.dotted;text:blue
@enduml
```



8.14.2 Nested element

8.14.3 Without sub-element

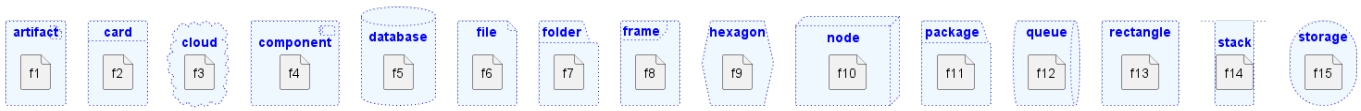
```
@startuml
artifact artifact #aliceblue;line:blue;line.dotted;text:blue {
}
card card #aliceblue;line:blue;line.dotted;text:blue {
}
cloud cloud #aliceblue;line:blue;line.dotted;text:blue {
}
component component #aliceblue;line:blue;line.dotted;text:blue {
}
database database #aliceblue;line:blue;line.dotted;text:blue {
}
file file #aliceblue;line:blue;line.dotted;text:blue {
```

```
}
folder folder #aliceblue;line:blue;line.dotted;text:blue {
}
frame frame #aliceblue;line:blue;line.dotted;text:blue {
}
hexagon hexagon #aliceblue;line:blue;line.dotted;text:blue {
}
node node #aliceblue;line:blue;line.dotted;text:blue {
}
package package #aliceblue;line:blue;line.dotted;text:blue {
}
queue queue #aliceblue;line:blue;line.dotted;text:blue {
}
rectangle rectangle #aliceblue;line:blue;line.dotted;text:blue {
}
stack stack #aliceblue;line:blue;line.dotted;text:blue {
}
storage storage #aliceblue;line:blue;line.dotted;text:blue {
}
@enduml
```

8.14.4 With sub-element

```
@startuml
artifact    artifactVeryLOOOOOOOOOOOOOOOOOOOg    as "artifact" #aliceblue;line:blue;line.dotted;text
file f1
}
card        cardVeryLOOOOOOOOOOOOOOOOOOOg        as "card" #aliceblue;line:blue;line.dotted;text:blu
file f2
}
cloud       cloudVeryLOOOOOOOOOOOOOOOOOOOg       as "cloud" #aliceblue;line:blue;line.dotted;text:bl
file f3
}
component   componentVeryLOOOOOOOOOOOOOOOOOOOg   as "component" #aliceblue;line:blue;line.dotted;tex
file f4
}
database    databaseVeryLOOOOOOOOOOOOOOOOOOOg    as "database" #aliceblue;line:blue;line.dotted;text
file f5
}
file        fileVeryLOOOOOOOOOOOOOOOOOOOg        as "file" #aliceblue;line:blue;line.dotted;text:blu
file f6
}
folder      folderVeryLOOOOOOOOOOOOOOOOOOOg      as "folder" #aliceblue;line:blue;line.dotted;text:b
file f7
}
frame       frameVeryLOOOOOOOOOOOOOOOOOOOg       as "frame" #aliceblue;line:blue;line.dotted;text:bl
file f8
}
hexagon     hexagonVeryLOOOOOOOOOOOOOOOOOOOg     as "hexagon" #aliceblue;line:blue;line.dotted;text:
file f9
}
node        nodeVeryLOOOOOOOOOOOOOOOOOOOg        as "node" #aliceblue;line:blue;line.dotted;text:blue
file f10
}
package     packageVeryLOOOOOOOOOOOOOOOOOOOg     as "package" #aliceblue;line:blue;line.dotted;text:
```

```
file f11
}
queue       queueVeryLOOOOOOOOOOOOOOOOOOg       as "queue" #aliceblue;line:blue;line.dotted;text:blu
file f12
}
rectangle   rectangleVeryLOOOOOOOOOOOOOOOOOOg   as "rectangle" #aliceblue;line:blue;line.dotted;text
file f13
}
stack       stackVeryLOOOOOOOOOOOOOOOOOOg       as "stack" #aliceblue;line:blue;line.dotted;text:blu
file f14
}
storage     storageVeryLOOOOOOOOOOOOOOOOOOg     as "storage" #aliceblue;line:blue;line.dotted;text:
file f15
}
@enduml
```



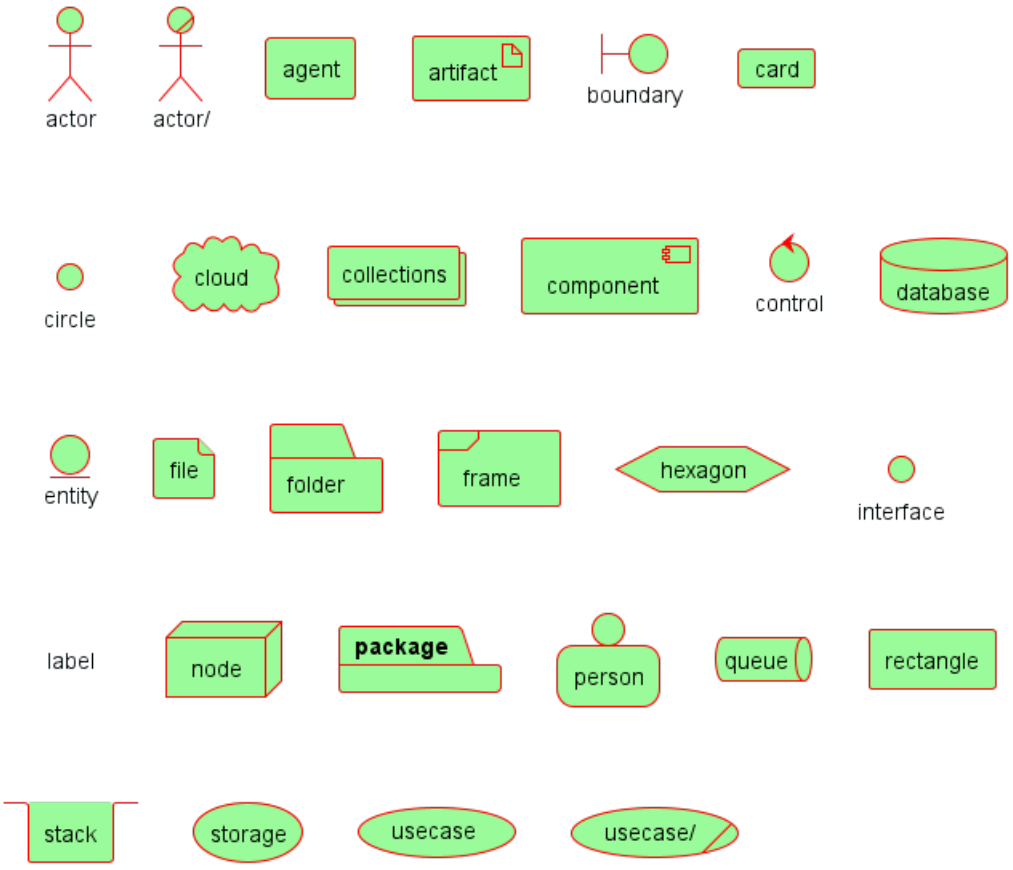
8.15 Appendix: Test of style on all element

8.15.1 Simple element

8.15.2 Global style (on componentDiagram)

```
@startuml
<style>
componentDiagram {
  BackGroundColor palegreen
  LineThickness 1
  LineColor red
}
document {
  BackGroundColor white
}
</style>
actor actor
actor/ "actor/"
agent agent
artifact artifact
boundary boundary
card card
circle circle
cloud cloud
collections collections
component component
control control
database database
entity entity
file file
folder folder
frame frame
hexagon hexagon
interface interface
label label
node node
package package
```

```
person person
queue queue
rectangle rectangle
stack stack
storage storage
usecase usecase
usecase/ "usecase/"
@enduml
```



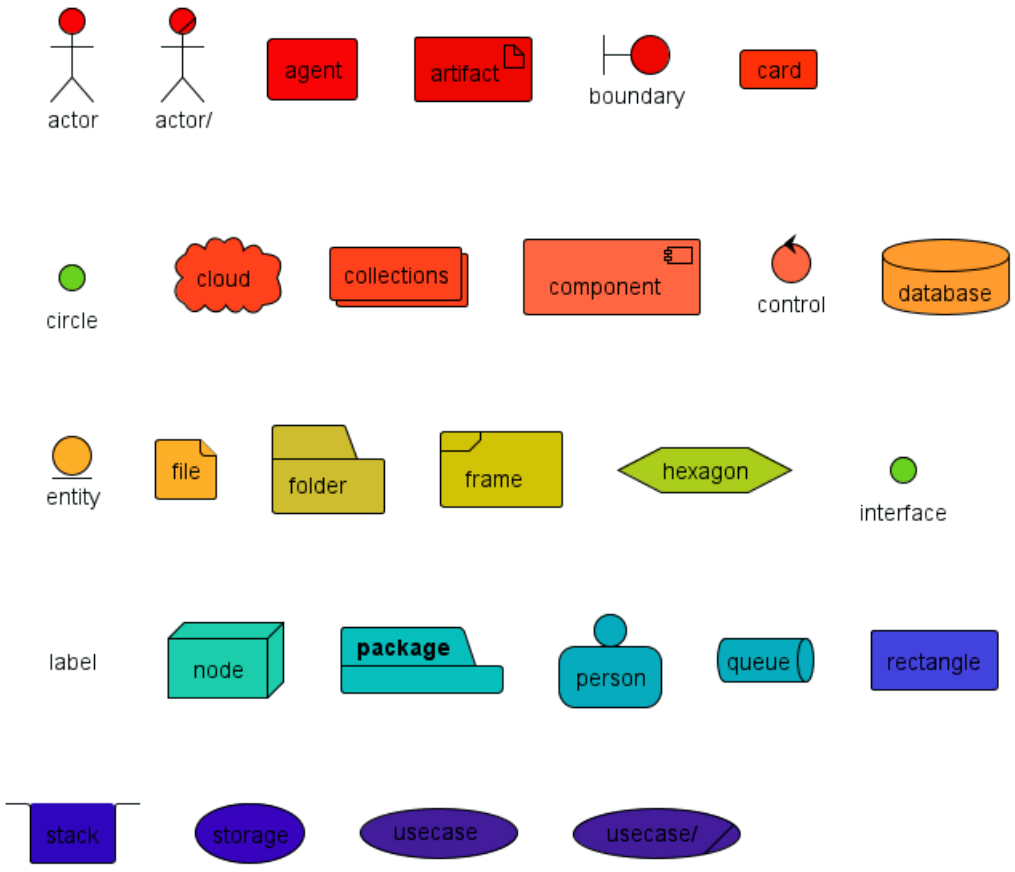
8.15.3 Style for each element

```
@startuml
<style>
actor {
  BackGroundColor #f80c12
  LineThickness 1
  LineColor black
}
agent {
  BackGroundColor #f80c12
  LineThickness 1
  LineColor black
}
artifact {
  BackGroundColor #ee1100
  LineThickness 1
  LineColor black
}
boundary {
  BackGroundColor #ee1100
  LineThickness 1
```

```
  LineColor black
}
card {
  BackGroundColor #ff3311
  LineThickness 1
  LineColor black
}
circle {
  BackGroundColor #ff3311
  LineThickness 1
  LineColor black
}
cloud {
  BackGroundColor #ff4422
  LineThickness 1
  LineColor black
}
collections {
  BackGroundColor #ff4422
  LineThickness 1
  LineColor black
}
component {
  BackGroundColor #ff6644
  LineThickness 1
  LineColor black
}
control {
  BackGroundColor #ff6644
  LineThickness 1
  LineColor black
}
database {
  BackGroundColor #ff9933
  LineThickness 1
  LineColor black
}
entity {
  BackGroundColor #feae2d
  LineThickness 1
  LineColor black
}
file {
  BackGroundColor #feae2d
  LineThickness 1
  LineColor black
}
folder {
  BackGroundColor #ccbb33
  LineThickness 1
  LineColor black
}
frame {
  BackGroundColor #d0c310
  LineThickness 1
  LineColor black
}
hexagon {
```

```
  BackGroundColor #aacc22
  LineThickness 1
  LineColor black
}
interface {
  BackGroundColor #69d025
  LineThickness 1
  LineColor black
}
label {
  BackGroundColor black
  LineThickness 1
  LineColor black
}
node {
  BackGroundColor #22ccaa
  LineThickness 1
  LineColor black
}
package {
  BackGroundColor #12bdb9
  LineThickness 1
  LineColor black
}
person {
  BackGroundColor #11aabb
  LineThickness 1
  LineColor black
}
queue {
  BackGroundColor #11aabb
  LineThickness 1
  LineColor black
}
rectangle {
  BackGroundColor #4444dd
  LineThickness 1
  LineColor black
}
stack {
  BackGroundColor #3311bb
  LineThickness 1
  LineColor black
}
storage {
  BackGroundColor #3b0cbd
  LineThickness 1
  LineColor black
}
usecase {
  BackGroundColor #442299
  LineThickness 1
  LineColor black
}
</style>
actor actor
actor/ "actor/"
agent agent
```

```
artifact artifact
boundary boundary
card card
circle circle
cloud cloud
collections collections
component component
control control
database database
entity entity
file file
folder folder
frame frame
hexagon hexagon
interface interface
label label
node node
package package
person person
queue queue
rectangle rectangle
stack stack
storage storage
usecase usecase
usecase/ "usecase/"
@enduml
```



[Ref. QA-13261]

8.15.4 Nested element (without level)

8.15.5 Global style (on componentDiagram)

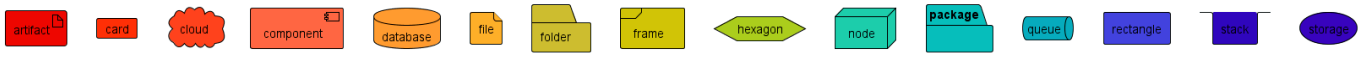
```
@startuml
<style>
componentDiagram {
  BackGroundColor palegreen
  LineThickness 2
  LineColor red
}
</style>
artifact artifact {
}
card card {
}
cloud cloud {
}
component component {
}
database database {
}
file file {
}
folder folder {
}
frame frame {
}
hexagon hexagon {
}
node node {
}
package package {
}
queue queue {
}
rectangle rectangle {
}
stack stack {
}
storage storage {
}
@enduml
```

8.15.6 Style for each nested element

```
@startuml
<style>
artifact {
  BackGroundColor #ee1100
  LineThickness 1
  LineColor black
}
card {
  BackGroundColor #ff3311
  LineThickness 1
```

```
  LineColor black
}
cloud {
  BackGroundColor #ff4422
  LineThickness 1
  LineColor black
}
component {
  BackGroundColor #ff6644
  LineThickness 1
  LineColor black
}
database {
  BackGroundColor #ff9933
  LineThickness 1
  LineColor black
}
file {
  BackGroundColor #feae2d
  LineThickness 1
  LineColor black
}
folder {
  BackGroundColor #ccbb33
  LineThickness 1
  LineColor black
}
frame {
  BackGroundColor #d0c310
  LineThickness 1
  LineColor black
}
hexagon {
  BackGroundColor #aacc22
  LineThickness 1
  LineColor black
}
node {
  BackGroundColor #22ccaa
  LineThickness 1
  LineColor black
}
package {
  BackGroundColor #12bdb9
  LineThickness 1
  LineColor black
}
queue {
  BackGroundColor #11aabb
  LineThickness 1
  LineColor black
}
rectangle {
  BackGroundColor #4444dd
  LineThickness 1
  LineColor black
}
stack {
```

```
  BackGroundColor #3311bb
  LineThickness 1
  LineColor black
}
storage {
  BackGroundColor #3b0cbd
  LineThickness 1
  LineColor black
}

</style>
artifact artifact {
}
card card {
}
cloud cloud {
}
component component {
}
database database {
}
file file {
}
folder folder {
}
frame frame {
}
hexagon hexagon {
}
node node {
}
package package {
}
queue queue {
}
rectangle rectangle {
}
stack stack {
}
storage storage {
}
@enduml
```

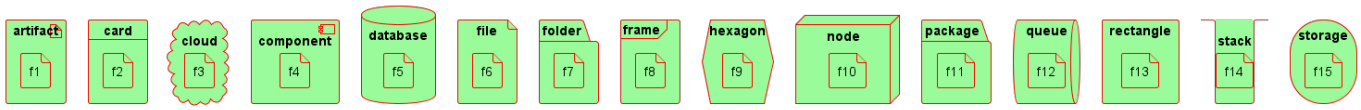


8.15.7 Nested element (with one level)

8.15.8 Global style (on componentDiagram)

```
@startuml
<style>
componentDiagram {
  BackGroundColor palegreen
  LineThickness 1
  LineColor red
}
document {
  BackGroundColor white
```

```
}
</style>
artifact e1 as "artifact" {
file f1
}
card e2 as "card" {
file f2
}
cloud e3 as "cloud" {
file f3
}
component e4 as "component" {
file f4
}
database e5 as "database" {
file f5
}
file e6 as "file" {
file f6
}
folder e7 as "folder" {
file f7
}
frame e8 as "frame" {
file f8
}
hexagon e9 as "hexagon" {
file f9
}
node e10 as "node" {
file f10
}
package e11 as "package" {
file f11
}
queue e12 as "queue" {
file f12
}
rectangle e13 as "rectangle" {
file f13
}
stack e14 as "stack" {
file f14
}
storage e15 as "storage" {
file f15
}
@enduml
```



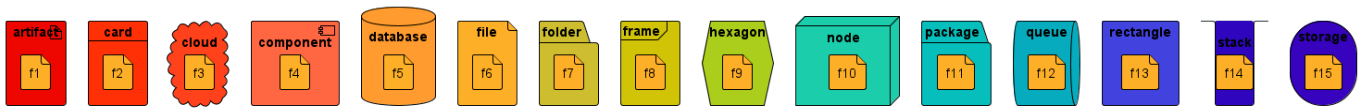
8.15.9 Style for each nested element

```
@startuml
<style>
```

```
artifact {
  BackGroundColor #ee1100
  LineThickness 1
  LineColor black
}
card {
  BackGroundColor #ff3311
  LineThickness 1
  LineColor black
}
cloud {
  BackGroundColor #ff4422
  LineThickness 1
  LineColor black
}
component {
  BackGroundColor #ff6644
  LineThickness 1
  LineColor black
}
database {
  BackGroundColor #ff9933
  LineThickness 1
  LineColor black
}
file {
  BackGroundColor #feae2d
  LineThickness 1
  LineColor black
}
folder {
  BackGroundColor #ccbb33
  LineThickness 1
  LineColor black
}
frame {
  BackGroundColor #d0c310
  LineThickness 1
  LineColor black
}
hexagon {
  BackGroundColor #aacc22
  LineThickness 1
  LineColor black
}
node {
  BackGroundColor #22ccaa
  LineThickness 1
  LineColor black
}
package {
  BackGroundColor #12bdb9
  LineThickness 1
  LineColor black
}
queue {
  BackGroundColor #11aabb
  LineThickness 1
```

```
  LineColor black
}
rectangle {
  BackGroundColor #4444dd
  LineThickness 1
  LineColor black
}
stack {
  BackGroundColor #3311bb
  LineThickness 1
  LineColor black
}
storage {
  BackGroundColor #3b0cbd
  LineThickness 1
  LineColor black
}
</style>
artifact e1 as "artifact" {
file f1
}
card e2 as "card" {
file f2
}
cloud e3 as "cloud" {
file f3
}
component e4 as "component" {
file f4
}
database e5 as "database" {
file f5
}
file e6 as "file" {
file f6
}
folder e7 as "folder" {
file f7
}
frame e8 as "frame" {
file f8
}
hexagon e9 as "hexagon" {
file f9
}
node e10 as "node" {
file f10
}
package e11 as "package" {
file f11
}
queue e12 as "queue" {
file f12
}
rectangle e13 as "rectangle" {
file f13
}
stack e14 as "stack" {
```

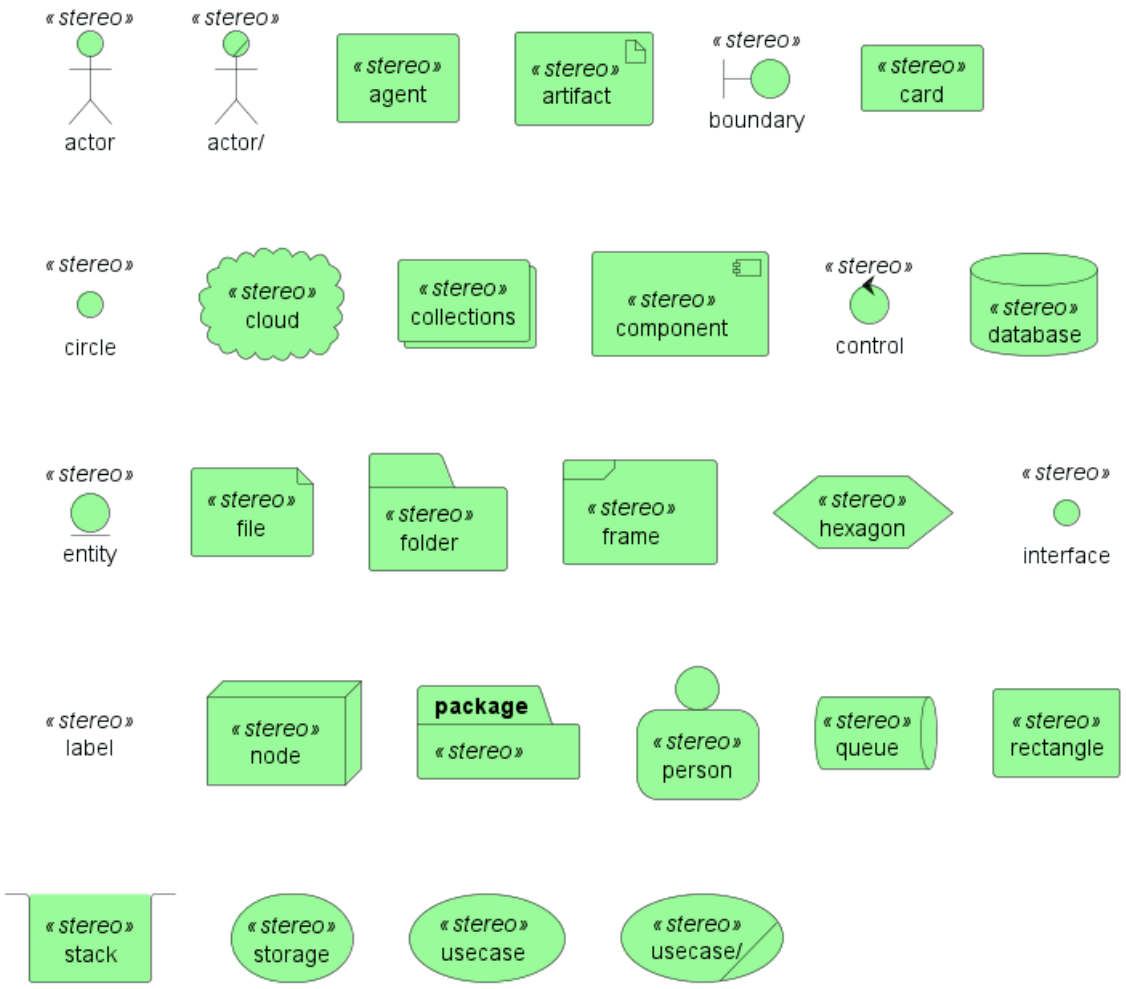
```
file f14
}
storage e15 as "storage" {
file f15
}
@enduml
```



8.16 Appendix: Test of stereotype with style on all element

8.16.1 Simple element

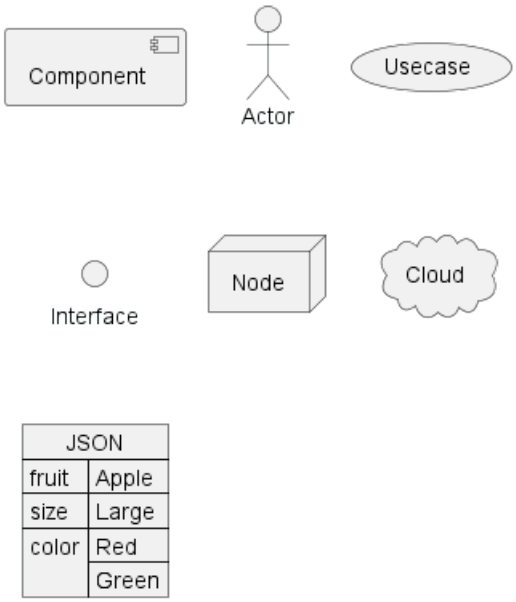
```
@startuml
<style>
.stereo {
  BackgroundColor palegreen
}
</style>
actor actor << stereo >>
actor/ "actor/" << stereo >>
agent agent << stereo >>
artifact artifact << stereo >>
boundary boundary << stereo >>
card card << stereo >>
circle circle << stereo >>
cloud cloud << stereo >>
collections collections << stereo >>
component component << stereo >>
control control << stereo >>
database database << stereo >>
entity entity << stereo >>
file file << stereo >>
folder folder << stereo >>
frame frame << stereo >>
hexagon hexagon << stereo >>
interface interface << stereo >>
label label << stereo >>
node node << stereo >>
package package << stereo >>
person person << stereo >>
queue queue << stereo >>
rectangle rectangle << stereo >>
stack stack << stereo >>
storage storage << stereo >>
usecase usecase << stereo >>
usecase/ "usecase/" << stereo >>
@enduml
```



8.17 Display JSON Data on Deployment diagram

8.17.1 Simple example

```
@startuml
allowmixing

component Component
actor     Actor
usecase   Usecase
()        Interface
node      Node
cloud     Cloud

json JSON {
   "fruit":"Apple",
   "size":"Large",
   "color": ["Red", "Green"]
}
@enduml
```



[Ref. QA-15481]

For another example, see on JSON page.

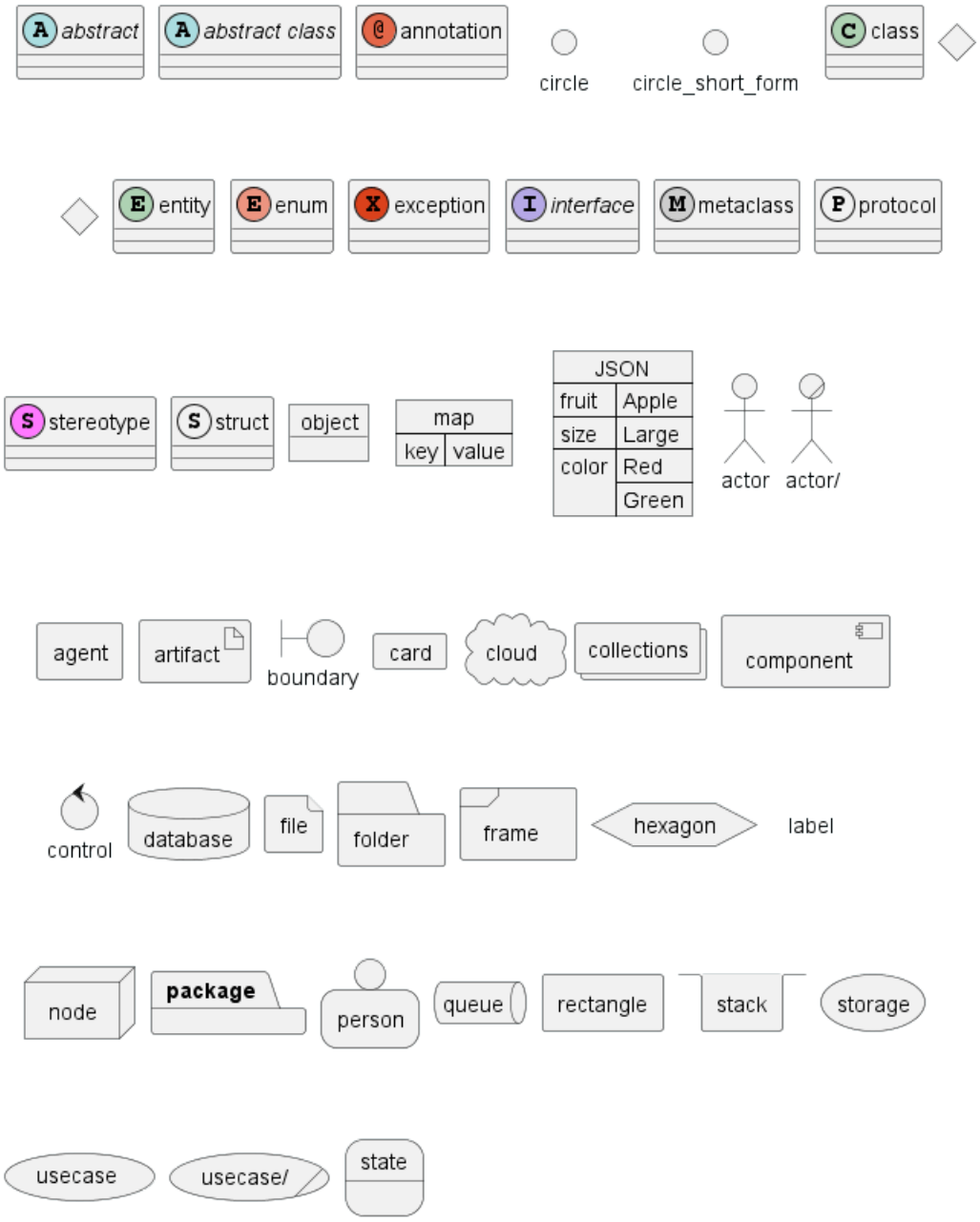
8.18 Mixing Deployment (Usecase, Component, Deployment) element within a Class or Object diagram

In order to add a Deployment element or a State element within a Class or Object diagram, you can use the `allowmixing` or `allow_mixing` directive.

8.18.1 Mixing all elements

```
@startuml

allowmixing

skinparam nodesep 10
abstract        abstract
abstract class  "abstract class"
annotation      annotation
circle          circle
()              circle_short_form
class           class
diamond         diamond
<>              diamond_short_form
entity          entity
enum            enum
exception       exception
interface       interface
metaclass       metaclass
protocol        protocol
stereotype      stereotype
struct          struct
object          object
map map {
 key => value
}
json JSON {
   "fruit":"Apple",
```

```
   "size":"Large",
   "color": ["Red", "Green"]
}
actor actor
actor/ "actor/"
agent agent
artifact artifact
boundary boundary
card card
circle circle
cloud cloud
collections collections
component component
control control
database database
entity entity
file file
folder folder
frame frame
hexagon hexagon
interface interface
label label
node node
package package
person person
queue queue
rectangle rectangle
stack stack
storage storage
usecase usecase
usecase/ "usecase/"
state state
@enduml
```



[Ref. QA-2335 and QA-5329]

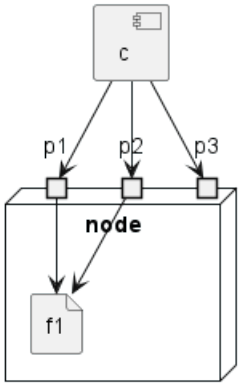
8.19 Port [port, portIn, portOut]

You can added **port** with `port`, `portin`and `portout` keywords.

8.19.1 Port

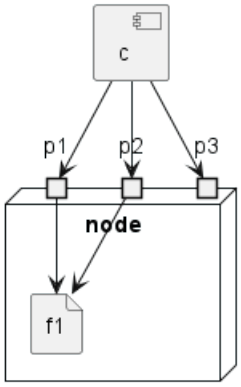
```
@startuml
[c]
node node {
  port p1
  port p2
  port p3
  file f1
}

c --> p1
```

```
c --> p2
c --> p3
p1 --> f1
p2 --> f1
@enduml
```



8.19.2 PortIn

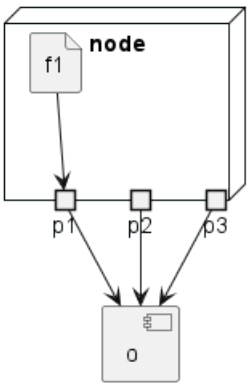
```
@startuml
[c]
node node {
  portin p1
  portin p2
  portin p3
  file f1
}

c --> p1
c --> p2
c --> p3
p1 --> f1
p2 --> f1
@enduml
```



8.19.3 PortOut

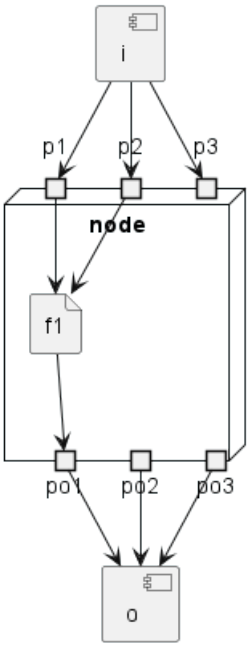
```
@startuml
node node {
  portout p1
  portout p2
  portout p3
  file f1
```

```
}
[o]
p1 --> o
p2 --> o
p3 --> o
f1 --> p1
@enduml
```



8.19.4 Mixing PortIn & PortOut

```
@startuml
[i]
node node {
  portin p1
  portin p2
  portin p3
  portout po1
  portout po2
  portout po3
  file f1
}
[o]

i --> p1
i --> p2
i --> p3
p1 --> f1
p2 --> f1
po1 --> o
po2 --> o
po3 --> o
f1 --> po1
@enduml
```


i
p1
p2
p3
node
f1
po1
po2
po3
o

9 Zustandsdiagramme

Using [**PlantUML**](https://plantuml.com/) to create state diagrams offers several advantages:

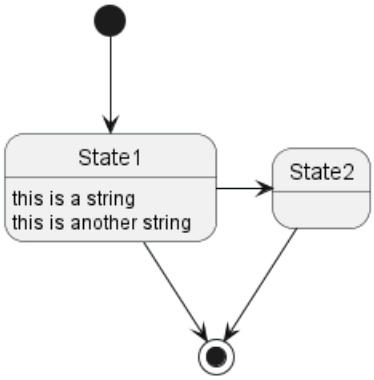
- **Text-Based Language**: Quickly define and visualize the states and transitions without the hassle of manual drawing.
- **Efficiency and Consistency**: Ensure streamlined diagram creation and easy version control.
- **Versatility**: Integrate with various documentation platforms and support multiple output formats.
- **Open-Source & Community Support**: Backed by a [**strong community**](https://forum.plantuml.net/) that continuously contributes to its enhancements and offers invaluable resources.

9.1 Einfacher Zustand

Sie können `[*]` für den Anfangs- und Endpunkt von des Zustandsdiagramms verwenden.

Verwenden Sie `-->` für Pfeile.

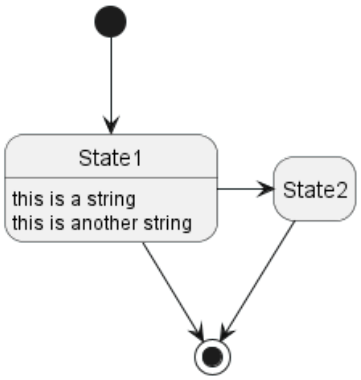
```
@startuml

[*] --> State1
State1 --> [*]
State1 : this is a string
State1 : this is another string

State1 -> State2
State2 --> [*]

@enduml
```



9.2 Ändern Sie die Darstellung des Zustands

Sie können `hide empty description` verwenden, um den Zustand als einfache Box darzustellen

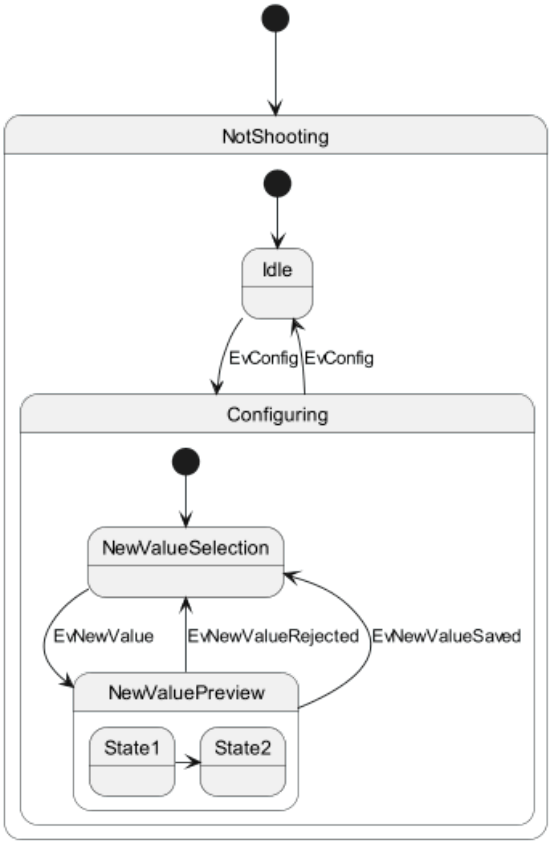
```
@startuml
hide empty description
[*] --> State1
State1 --> [*]
State1 : this is a string
State1 : this is another string

State1 -> State2
State2 --> [*]
@enduml
```



9.3 Verschachtelter Zustand

Ein Zustand kann auch verschachtelt werden. Dies funktioniert mit dem `state` Schlüsselwort und den geschweiften Klammern.

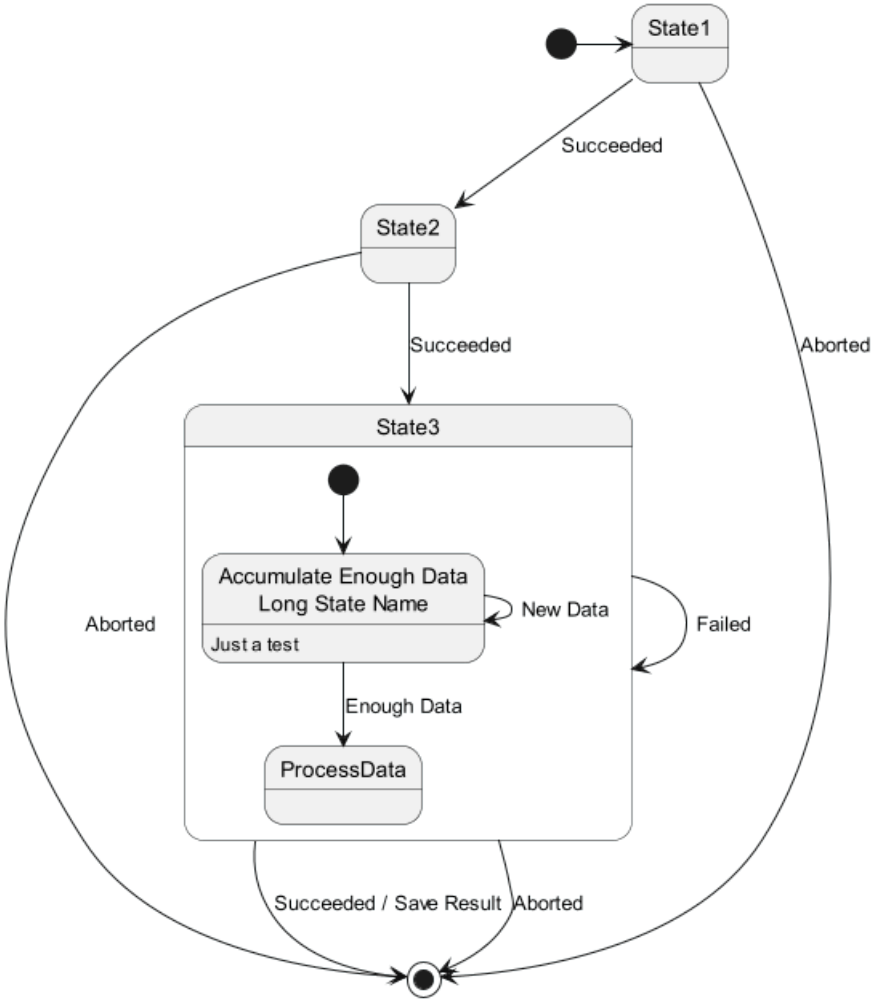
```
@startuml
scale 350 width
[*] --> NotShooting

state NotShooting {
  [*] --> Idle
  Idle --> Configuring : EvConfig
  Configuring --> Idle : EvConfig
}

state Configuring {
  [*] --> NewValueSelection
  NewValueSelection --> NewValuePreview : EvNewValue
  NewValuePreview --> NewValueSelection : EvNewValueRejected
  NewValuePreview --> NewValueSelection : EvNewValueSaved

  state NewValuePreview {
     State1 -> State2
  }

}
@enduml
```



9.4 Lange Bezeichnungen für einen Zustand

Mit dem `state` Schlüsselwort können auch längere Bezeichnungen eines Status definiert werden.

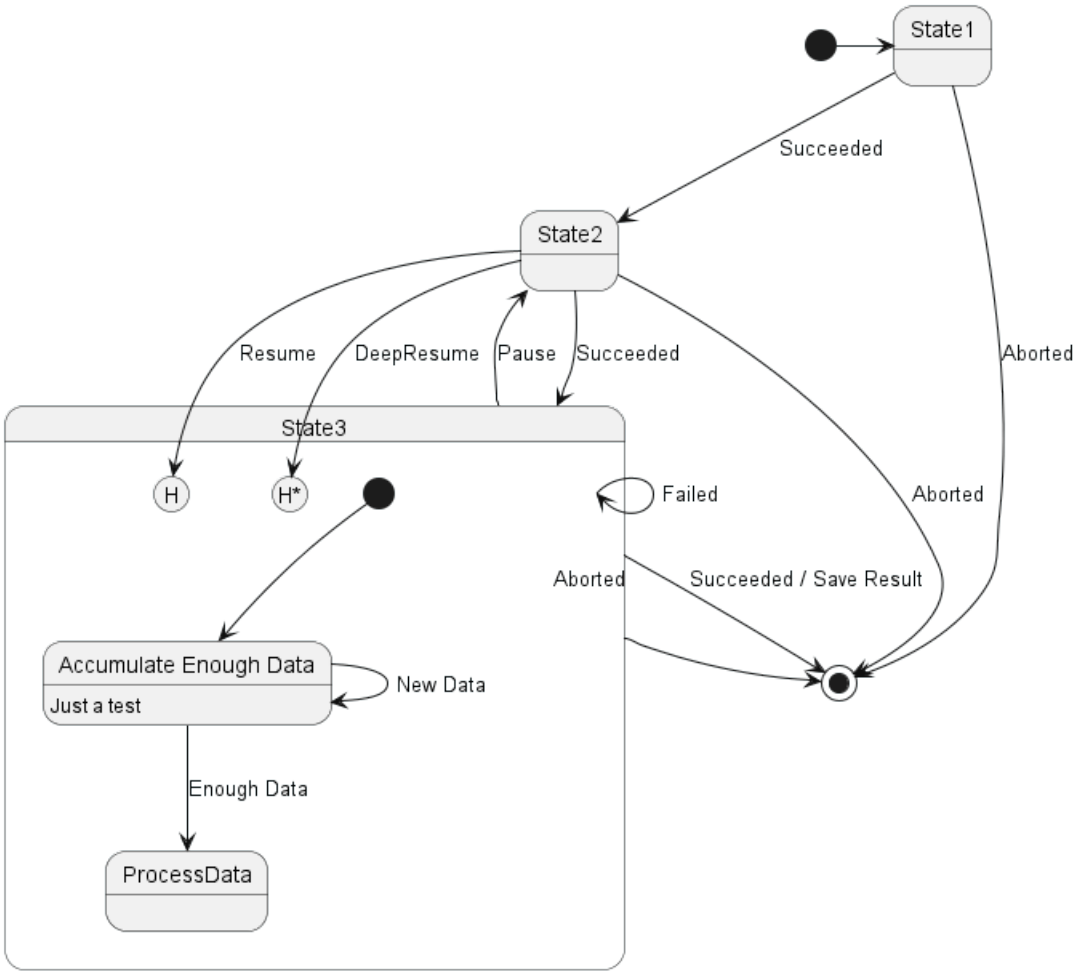
```
@startuml
scale 600 width

[*] -> State1
State1 --> State2 : Succeeded
State1 --> [*] : Aborted
State2 --> State3 : Succeeded
State2 --> [*] : Aborted
state State3 {
  state "Accumulate Enough Data\nLong State Name" as long1
  long1 : Just a test
  [*] --> long1
  long1 --> long1 : New Data
  long1 --> ProcessData : Enough Data
}
State3 --> State3 : Failed
State3 --> [*] : Succeeded / Save Result
State3 --> [*] : Aborted

@enduml
```



9.5 History [[H], [H*]]

You can use `[H]` for the history and `[H*]` for the deep history of a substate.

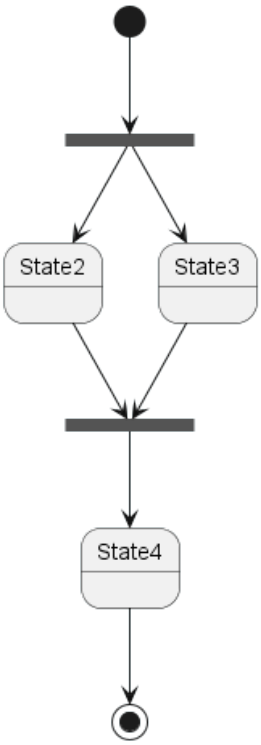
```
@startuml
[*] -> State1
State1 --> State2 : Succeeded
State1 --> [*] : Aborted
State2 --> State3 : Succeeded
State2 --> [*] : Aborted
state State3 {
  state "Accumulate Enough Data" as long1
  long1 : Just a test
  [*] --> long1
  long1 --> long1 : New Data
  long1 --> ProcessData : Enough Data
  State2 --> [H]: Resume
}
State3 --> State2 : Pause
State2 --> State3[H*]: DeepResume
State3 --> State3 : Failed
State3 --> [*] : Succeeded / Save Result
State3 --> [*] : Aborted
@enduml
```



9.6 Fork [fork, join]

You can also fork and join using the `<<fork>>` and `<<join>>` stereotypes.

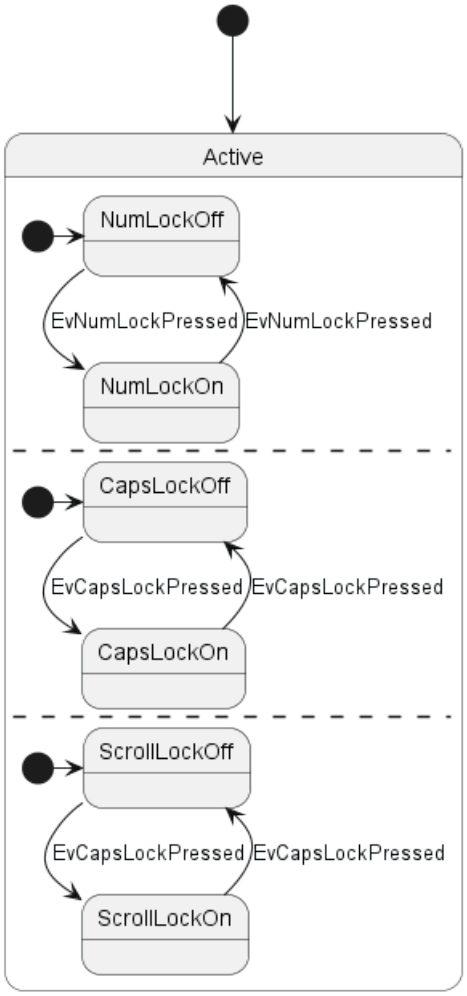
```
@startuml

state fork_state <<fork>>
[*] --> fork_state
fork_state --> State2
fork_state --> State3

state join_state <<join>>
State2 --> join_state
State3 --> join_state
join_state --> State4
State4 --> [*]

@enduml
```



9.7 Nebenläufige Zustände

Nebenläufige Zustände können mit dem `--` oder `||` Symbol in einem zusammengesetzten Zustand zusammengefasst werden..

```
@startuml
[*] --> Active

state Active {
  [*] -> NumLockOff
  NumLockOff --> NumLockOn : EvNumLockPressed
  NumLockOn --> NumLockOff : EvNumLockPressed
  --
  [*] -> CapsLockOff
  CapsLockOff --> CapsLockOn : EvCapsLockPressed
  CapsLockOn --> CapsLockOff : EvCapsLockPressed
  --
  [*] -> ScrollLockOff
  ScrollLockOff --> ScrollLockOn : EvCapsLockPressed
  ScrollLockOn --> ScrollLockOff : EvCapsLockPressed
}

@enduml
```

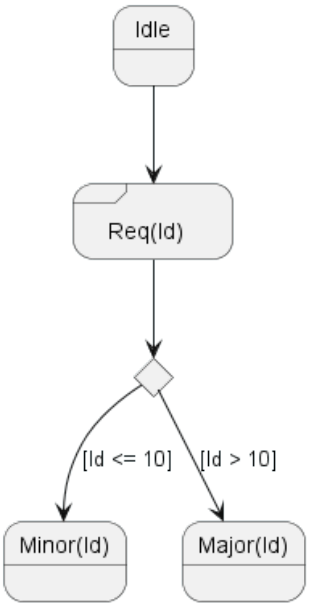


[Ref. QA-3086]

9.8 Conditional [choice]

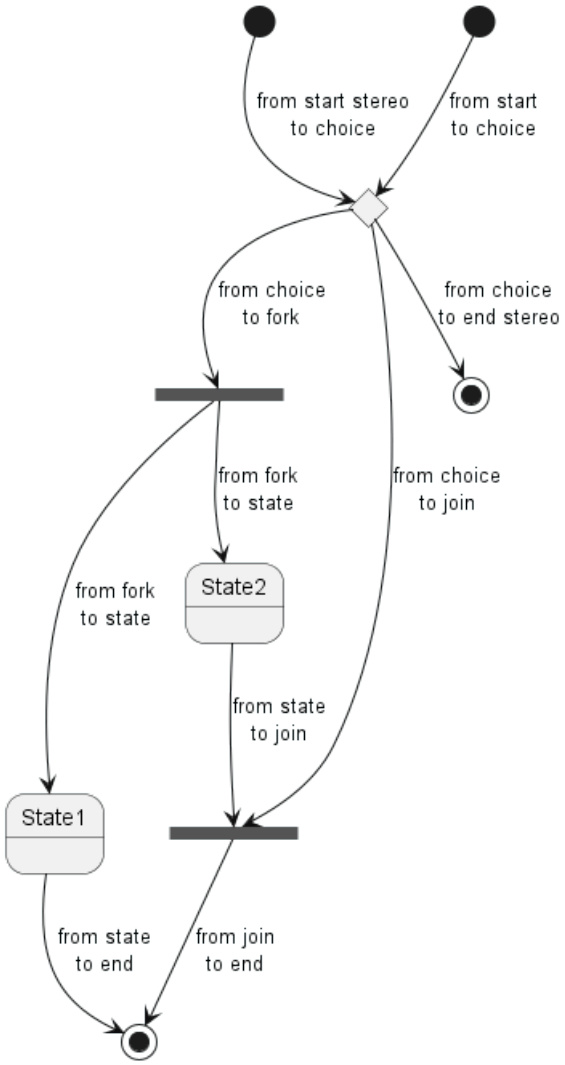
The stereotype `<<choice>>` can be used to use conditional state.

```
@startuml
state "Req(Id)" as ReqId <<sdlreceive>>
state "Minor(Id)" as MinorId
state "Major(Id)" as MajorId

state c <<choice>>

Idle --> ReqId
ReqId --> c
c --> MinorId : [Id <= 10]
c --> MajorId : [Id > 10]
@enduml
```



9.9 Stereotypes full example [start, choice, fork, join, end]

```
@startuml
state start1  <<start>>
state choice1 <<choice>>
state fork1   <<fork>>
state join2   <<join>>
state end3    <<end>>

[*]     --> choice1 : from start\nto choice
start1  --> choice1 : from start stereo\nto choice

choice1 --> fork1   : from choice\nto fork
choice1 --> join2   : from choice\nto join
choice1 --> end3    : from choice\nto end stereo

fork1   ---> State1 : from fork\nto state
fork1   --> State2  : from fork\nto state

State2  --> join2   : from state\nto join
State1  --> [*]     : from state\nto end

join2   --> [*]     : from join\nto end
@enduml
```

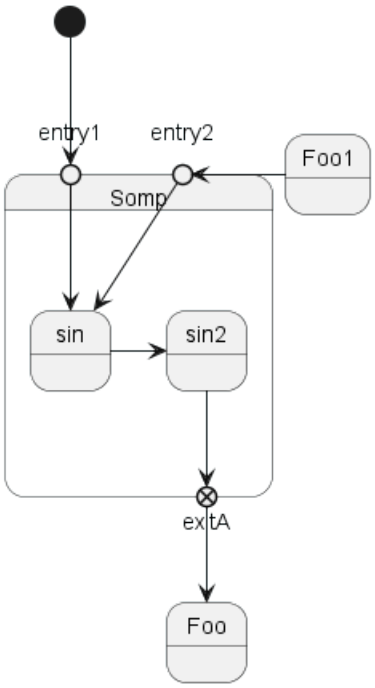


[Ref. QA-404, QA-1159 and GH-887]

9.10 Point [entryPoint, exitPoint]

You can add **point** with `<<entryPoint>>` and `<<exitPoint>>` stereotypes:

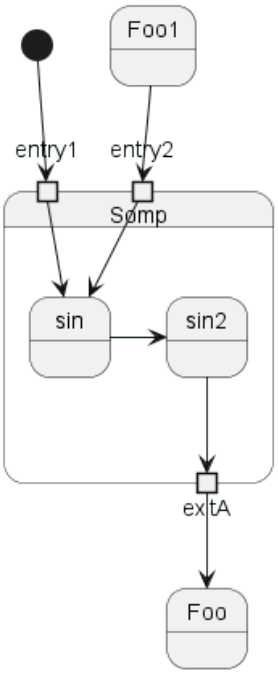
```
@startuml
state Somp {
  state entry1 <<entryPoint>>
  state entry2 <<entryPoint>>
  state sin
  entry1 --> sin
  entry2 -> sin
  sin -> sin2
  sin2 --> exitA <<exitPoint>>
}

[*] --> entry1
exitA --> Foo
Foo1 -> entry2
@enduml
```



9.11 Pin [inputPin, outputPin]

Du kannst auch **pin** mit `<<inputPin>>` und `<<outputPin>>` stereotypes: hinzufügen

```
@startuml
state Somp {
  state entry1 <<inputPin>>
  state entry2 <<inputPin>>
  state sin
  entry1 --> sin
  entry2 -> sin
  sin -> sin2
  sin2 --> exitA <<outputPin>>
}

[*] --> entry1
exitA --> Foo
Foo1 --> entry2
@enduml
```

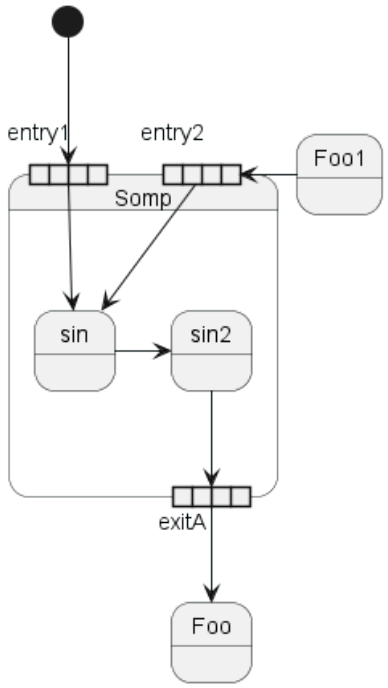


[Ref. QA-4309]

9.12 Expansion [expansionInput, expansionOutput]

You can add **expansion** with `<<expansionInput>>` and `<<expansionOutput>>` stereotypes:

```
@startuml
state Somp {
  state entry1 <<expansionInput>>
  state entry2 <<expansionInput>>
  state sin
  entry1 --> sin
  entry2 -> sin
  sin -> sin2
  sin2 --> exitA <<expansionOutput>>
}

[*] --> entry1
exitA --> Foo
Foo1 -> entry2
@enduml
```



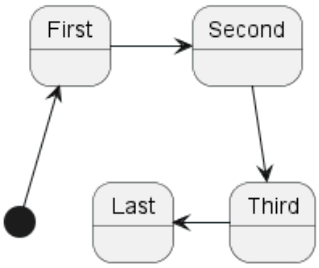
[Ref. QA-4309]

9.13 Pfeilrichtung

Mit dem `->` Symbol können waagerechte Pfeile erzeugt werden. Man kann die Richtung der Pfeile außerdem mit der folgenden Syntax festlegen:

- `-down->` (default arrow)
- `-right->` or `->`
- `-left->`
- `-up->`

```
@startuml

[*] -up-> First
First -right-> Second
Second --> Third
Third -left-> Last

@enduml
```



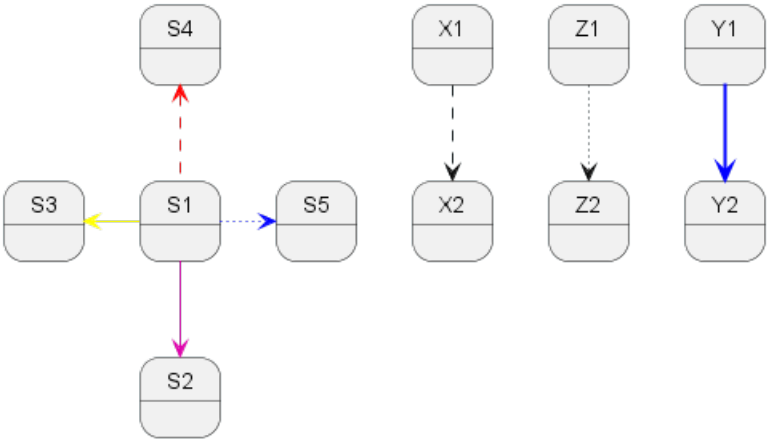
Man kann die Länge eines Pfeils verkürzen, in dem man nur den ersten Buchstaben der Richtung verwendet (zum Beispiel, `-d-` anstelle von `-down-`) oder die ersten beiden Buchstaben (`-do-`).

Beachten Sie, dass sie mit dieser Möglichkeit sorgfältig umgehen: *GraphViz* liefert normalerweise recht gute Ergebnisse, ohne das manuell eingegriffen werden muss.

9.14 Change line color and style

You can change line color and/or line style.

```
@startuml
State S1
State S2
S1 -[#DD00AA]-> S2
S1 -left[#yellow]-> S3
S1 -up[#red,dashed]-> S4
S1 -right[dotted,#blue]-> S5

X1 -[dashed]-> X2
Z1 -[dotted]-> Z2
Y1 -[#blue,bold]-> Y2
@enduml
```

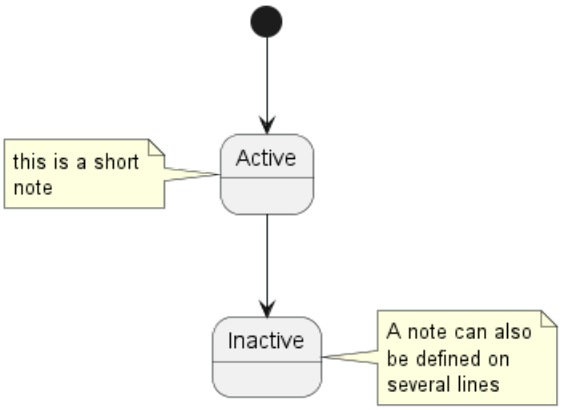


[Ref. Incubation: Change line color in state diagrams]

9.15 Notizen

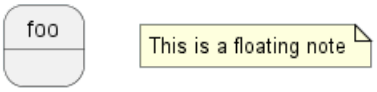
Notizen können mit den `note left of`, `note right of`, `note top of`, `note bottom of` Schlüsselworten an die Zustände gebunden werden. Die Notizen können sich auch über mehrere Zeilen erstrecken.

```
@startuml

[*] --> Active
Active --> Inactive

note left of Active : this is a short\nnote

note right of Inactive
  A note can also
  be defined on
  several lines
end note

@enduml
```



Es ist auch möglich, freistehende Notizen hinzuzufügen.

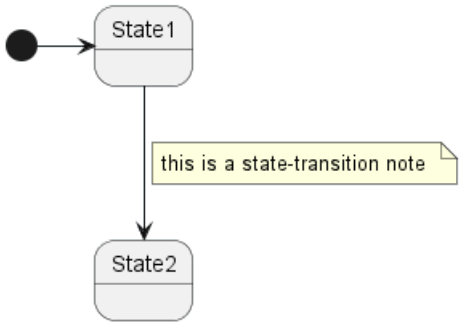
```
@startuml

state foo
note "This is a floating note" as N1

@enduml
```



9.16 Note on link

You can put notes on state-transition or link, with `note on link` keyword.

```
@startuml
[*] -> State1
State1 --> State2
note on link
  this is a state-transition note
end note
@enduml
```

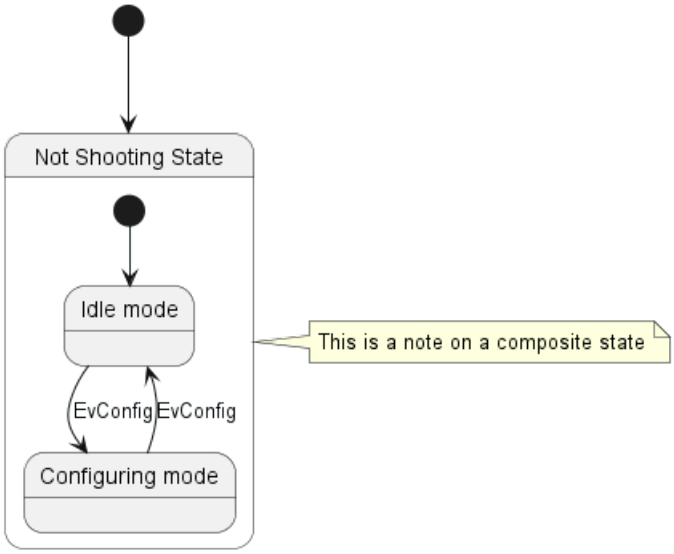


9.17 Mehr über Notizen

Es ist auch möglich, Notizen für einen verbunden Zustand zu erstellen.

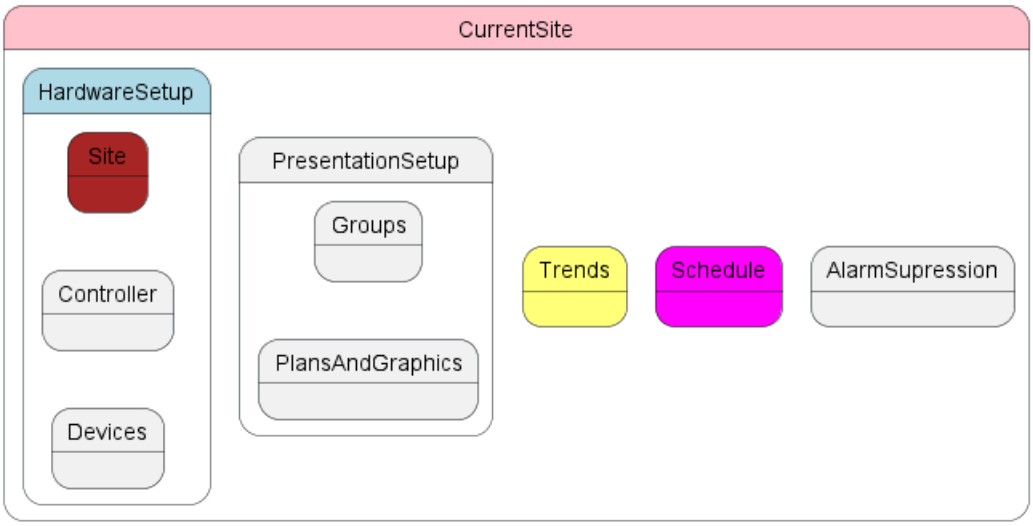
```
@startuml

[*] --> NotShooting

state "Not Shooting State" as NotShooting {
  state "Idle mode" as Idle
  state "Configuring mode" as Configuring
```

```
  [*] --> Idle
  Idle --> Configuring : EvConfig
  Configuring --> Idle : EvConfig
}

note right of NotShooting : This is a note on a composite state

@enduml
```



9.18 Inline color

```
@startuml
state CurrentSite #pink {
    state HardwareSetup #lightblue {
       state Site #brown
        Site -[hidden]-> Controller
        Controller -[hidden]-> Devices
    }
    state PresentationSetup{
        Groups -[hidden]-> PlansAndGraphics
    }
    state Trends #FFFF77
    state Schedule #magenta
    state AlarmSupression
}
@enduml
```



[Ref. QA-1812]

9.19 Skinparam

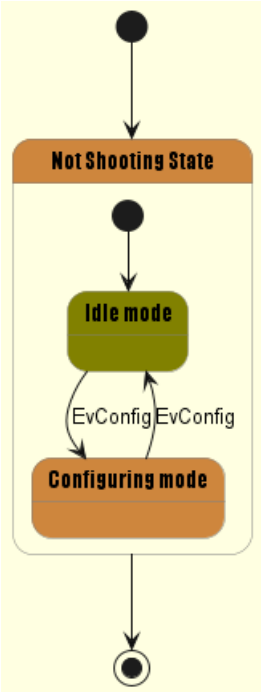
Mit dem skinparam Befehl kann die Farbe und die Schriftart der Zeichnung verändert werden.

Sie können den Befehl auf die folgenden Arten verwenden:

- Wie alle ander Befehle In einer Diagrammdefinition,
- in einer Include-Datei,
- In einer Konfigurationsdatei, die durch die Kommandozeile oder den ANT-Task übergeben wird.

Es können spezielle Farben und Schriftarten für stereotypische Zustände definiert werden.

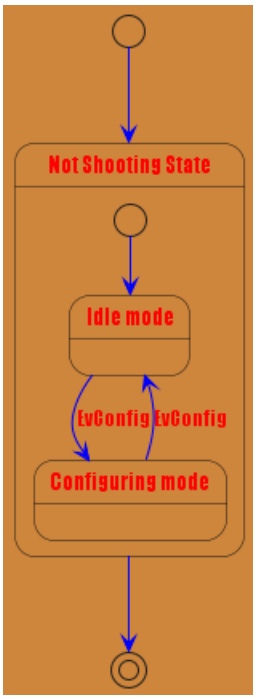
```
@startuml
skinparam backgroundColor LightYellow
skinparam state {
  StartColor MediumBlue
  EndColor Red
  BackgroundColor Peru
  BackgroundColor<<Warning>> Olive
  BorderColor Gray
  FontName Impact
}

[*] --> NotShooting

state "Not Shooting State" as NotShooting {
  state "Idle mode" as Idle <<Warning>>
  state "Configuring mode" as Configuring
  [*] --> Idle
  Idle --> Configuring : EvConfig
  Configuring --> Idle : EvConfig
}

NotShooting --> [*]
@enduml
```



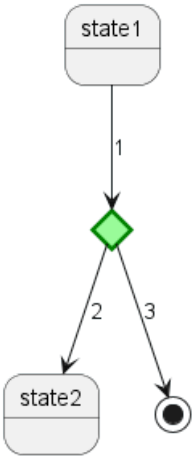
9.20 Changing style

You can change style.

```
@startuml

<style>
stateDiagram {
  BackgroundColor Peru
  'LineColor Gray
  FontName Impact
  FontColor Red
  arrow {
    FontSize 13
    LineColor Blue
  }
}
</style>


[*] --> NotShooting

state "Not Shooting State" as NotShooting {
  state "Idle mode" as Idle <<Warning>>
  state "Configuring mode" as Configuring
  [*] --> Idle
  Idle --> Configuring : EvConfig
  Configuring --> Idle : EvConfig
}

NotShooting --> [*]
@enduml
```




```
@startuml
<style>
  diamond {
    BackgroundColor #palegreen
    LineColor #green
    LineThickness 2.5
}
</style>
state state1
state state2
state choice1 <<choice>>
state end3    <<end>>

state1  --> choice1 : 1
choice1 --> state2  : 2
choice1 --> end3    : 3
@enduml
```



[Ref. GH-880]

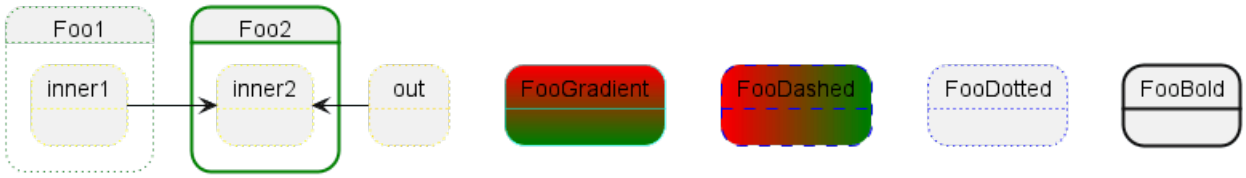
9.21 Change state color and style (inline style)

You can change the color or style of individual state using the following notation:

- `#color ##[style]color`

With background color first (`#color`), then line style and line color (`##[style]color`).

```
@startuml
state FooGradient #red-green ##00FFFF
state FooDashed #red|green ##[dashed]blue {
}
state FooDotted ##[dotted]blue {
}
state FooBold ##[bold] {
}
state Foo1 ##[dotted]green {
state inner1 ##[dotted]yellow
}

state out ##[dotted]gold

state Foo2 ##[bold]green {
state inner2 ##[dotted]yellow
}
inner1 -> inner2
out -> inner2
@enduml
```



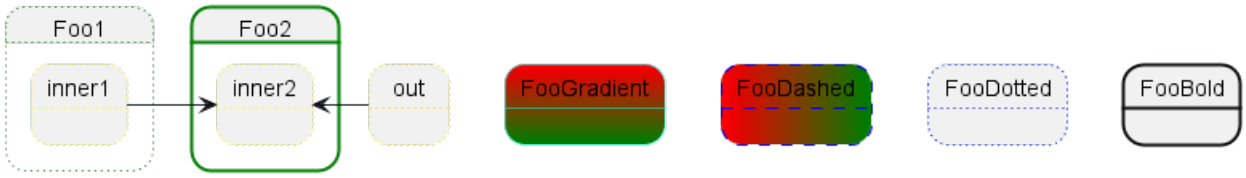
[Ref. QA-1487]

- `#color;line:color;line.[bold|dashed|dotted];text:color`

TODO: FIXME `text:color` seems not to be taken into account **TODO:** FIXME

```
@startuml
@startuml
state FooGradient #red-green;line:00FFFF
state FooDashed #red|green;line.dashed;line:blue {
}
state FooDotted #line.dotted;line:blue {
}
state FooBold #line.bold {
}
state Foo1 #line.dotted;line:green {
state inner1 #line.dotted;line:yellow
}

state out #line.dotted;line:gold

state Foo2 #line.bold;line:green {
state inner2 #line.dotted;line:yellow
}
inner1 -> inner2
out -> inner2
```

```
@enduml
@enduml
```



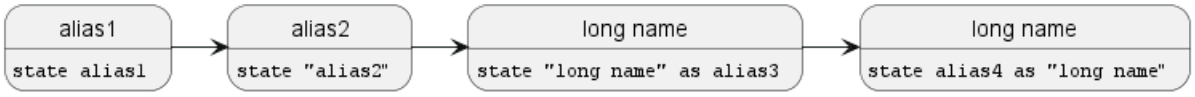

```
@startuml
state s1 : s1 description
state s2 #pink;line:red;line.bold;text:red : s2 description
state s3 #palegreen;line:green;line.dashed;text:green : s3 description
state s4 #aliceblue;line:blue;line.dotted;text:blue   : s4 description
@enduml
```

[Adapted from QA-3770]

9.22 Alias

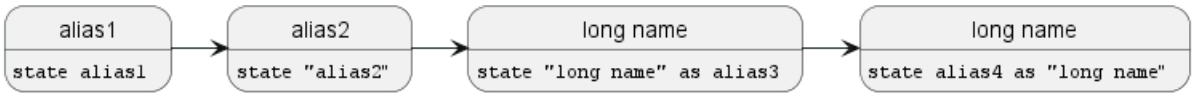
With State you can use `alias`, like:

```
@startuml
state alias1
state "alias2"
state "long name" as alias3
state alias4 as "long name"

alias1 : ""state alias1""
alias2 : ""state "alias2"""
alias3 : ""state "long name" as alias3""
alias4 : ""state alias4 as "long name""""

alias1 -> alias2
alias2 -> alias3
alias3 -> alias4
@enduml
```



or:

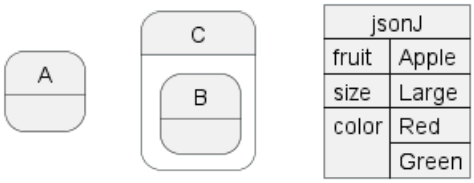
```
@startuml
state alias1 : ""state alias1""
state "alias2" : ""state "alias2"""
state "long name" as alias3 : ""state "long name" as alias3""
state alias4 as "long name" : ""state alias4 as "long name""""

alias1 -> alias2
alias2 -> alias3
alias3 -> alias4
@enduml
```



9.23 Display JSON Data on State diagram

9.23.1 Simple example

```
@startuml
state "A" as stateA
state "C" as stateC {
 state B
}

json jsonJ {
   "fruit":"Apple",
   "size":"Large",
   "color": ["Red", "Green"]
}
@enduml
```



[Ref. QA-17275]

For another example, see on JSON page.

10 Zeitverlaufsdiagramm

Dieser Teil ist eine Entwicklerversion und noch nicht stabil. Wir sind hier jederzeit offen für Änderungen und neue Features, die noch fehlen.

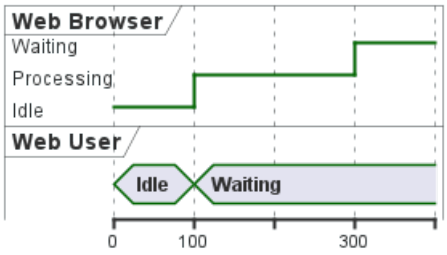
10.1 Definition von Elementen und Teilnehmern

Schlüsselwörter steuern die Darstellung der Teilnehmer in der Grafik. Mit folgenden Schlüsselwörtern kann die Darstellung gesteuert werden:

Schlüsselwort	Beschreibung
`analog`	`analog` stellt den Statusübergang des Teilnehmers als analoges Signal dar, in dem die angegebenen
`binary`	`binary` Lässt für den Teilnehmer zwei Stati zu, zwischen denen er wechseln kann
`clock`	`clocked` stellt eine Rechtecksignal für den Teilnehmer dar. `period` wird die Frequenz für den Status
`concise`	`concise` ist eine vereinfachte Darstellung um einen Statusübergang eines Teilnehmers darzustellen (
`robust`	`robust` stellt eine Signallinie dar, welche den Übergang von verschiedenen Statusübergängen darstell

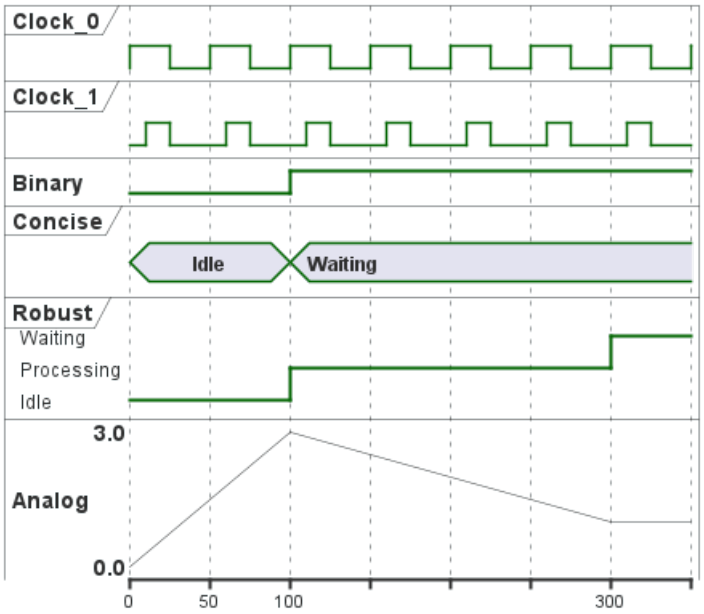
Ein Zeitpunkt eines Statuswechsels in der Zeitlinie wird mit `@` festgelegt. Der jeweilige Status des Teilnehmers zu diesem Zeitpunkt wird mit `is` definiert.

```
@startuml
robust "Web Browser" as WB
concise "Web User" as WU

@0
WU is Idle
WB is Idle

@100
WU is Waiting
WB is Processing

@300
WB is Waiting
@enduml
```




```
@startuml
clock   "Clock_0"   as C0 with period 50
clock   "Clock_1"   as C1 with period 50 pulse 15 offset 10
binary  "Binary"  as B
concise "Concise" as C
robust  "Robust"  as R
analog  "Analog"  as A


@0
C is Idle
R is Idle
A is 0

@100
```

```
B is high
C is Waiting
R is Processing
A is 3

@300
R is Waiting
A is 1
@enduml
```



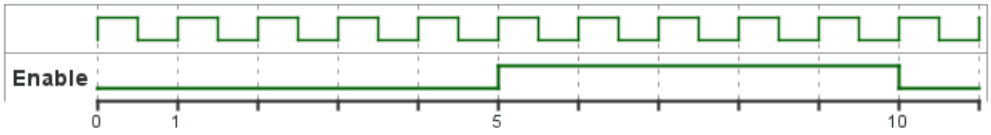
[Ref. QA-14631, QA-14647 and QA-11288]

10.2 Binary and Clock

It's also possible to have binary and clock signal, using the following keywords:

- `binary`
- `clock`

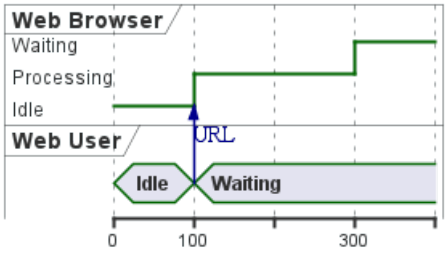
```
@startuml
clock clk with period 1
binary "Enable" as EN

@0
EN is low

@5
EN is high

@10
EN is low
@enduml
```



10.3 Adding message

You can add message using the following syntax.

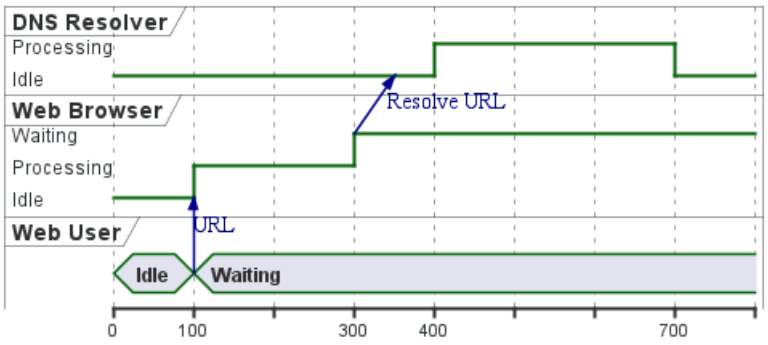
```
@startuml
robust "Web Browser" as WB
concise "Web User" as WU

@0
WU is Idle
WB is Idle

@100
WU -> WB : URL
WU is Waiting
WB is Processing

@300
WB is Waiting
@enduml
```



10.4 Relative time

It is possible to use relative time with `@`.

```
@startuml
robust "DNS Resolver" as DNS
robust "Web Browser" as WB
concise "Web User" as WU

@0
WU is Idle
WB is Idle
DNS is Idle

@+100
WU -> WB : URL
WU is Waiting
WB is Processing

@+200
WB is Waiting
WB -> DNS@+50 : Resolve URL

@+100
DNS is Processing

@+300
DNS is Idle
@enduml
```

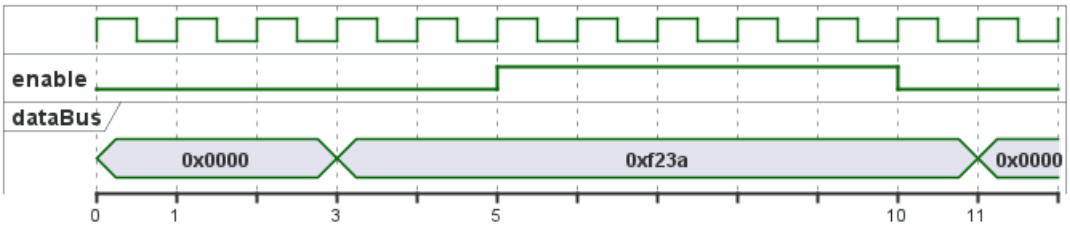


10.5 Anchor Points

Instead of using absolute or relative time on an absolute time you can define a time as an anchor point by using the `as` keyword and starting the name with a `:`.

```
@XX as :<anchor point name>
```

```
@startuml
clock clk with period 1
binary "enable" as EN
concise "dataBus" as db

@0 as :start
@5 as :en_high
@10 as :en_low
@:en_high-2 as :en_highMinus2

@:start
EN is low
db is "0x0000"

@:en_high
EN is high

@:en_low
EN is low

@:en_highMinus2
db is "0xf23a"

@:en_high+6
db is "0x0000"
@enduml
```

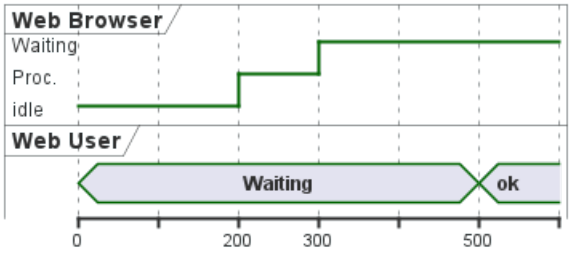


10.6 Participant oriented

Rather than declare the diagram in chronological order, you can define it by participant.

```
@startuml
```

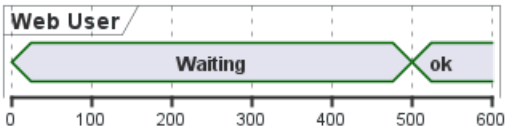
```
robust "Web Browser" as WB
concise "Web User" as WU

@WB
0 is idle
+200 is Proc.
+100 is Waiting

@WU
0 is Waiting
+500 is ok
@enduml
```



10.7 Setting scale

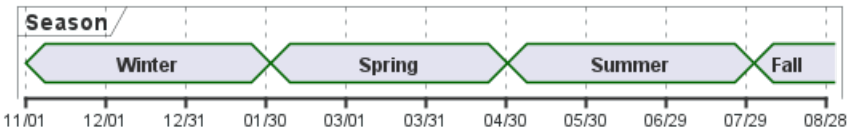
You can also set a specific scale.

```
@startuml
concise "Web User" as WU
scale 100 as 50 pixels

@WU
0 is Waiting
+500 is ok
@enduml
```



When using absolute Times/Dates, 1 ”tick” is equivalent to 1 second.

```
@startuml
concise "Season" as S
'30 days is scaled to 50 pixels
scale 2592000 as 50 pixels

@2000/11/01
S is "Winter"

@2001/02/01
S is "Spring"

@2001/05/01
S is "Summer"

@2001/08/01
S is "Fall"
@enduml
```



10.8 Initial state

You can also define an inital state.

```
@startuml
robust "Web Browser" as WB
concise "Web User" as WU

WB is Initializing
WU is Absent

@WB
0 is idle
+200 is Processing
+100 is Waiting

@WU
0 is Waiting
+500 is ok
@enduml
```

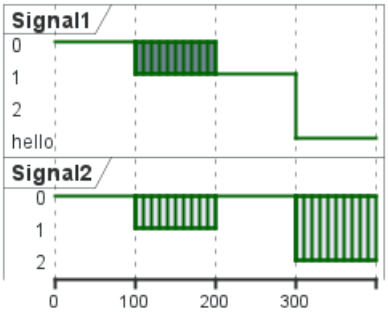
10.9 Intricated state

A signal could be in some undefined state.

10.9.1 Intricated or undefined robust state

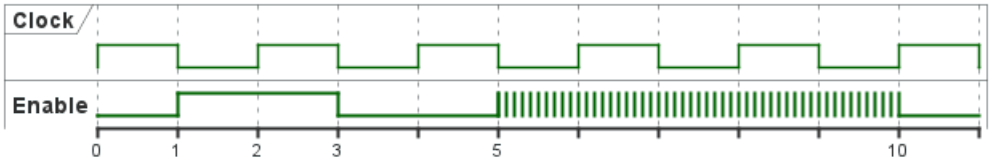
```
@startuml
robust "Signal1" as S1
robust "Signal2" as S2
S1 has 0,1,2,hello
S2 has 0,1,2
@0
S1 is 0
S2 is 0
@100
S1 is {0,1} #SlateGrey
S2 is {0,1}
@200
S1 is 1
S2 is 0
@300
S1 is hello
```

```
S2 is {0,2}
@enduml
```



10.9.2 Intricated or undefined binary state

```
@startuml
clock "Clock" as C with period 2
binary "Enable" as EN

@0
EN is low
@1
EN is high
@3
EN is low
@5
EN is {low,high}
@10
EN is low
@enduml
```



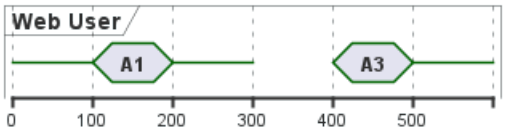
[Ref. QA-11936 and QA-15933]

10.10 Hidden state

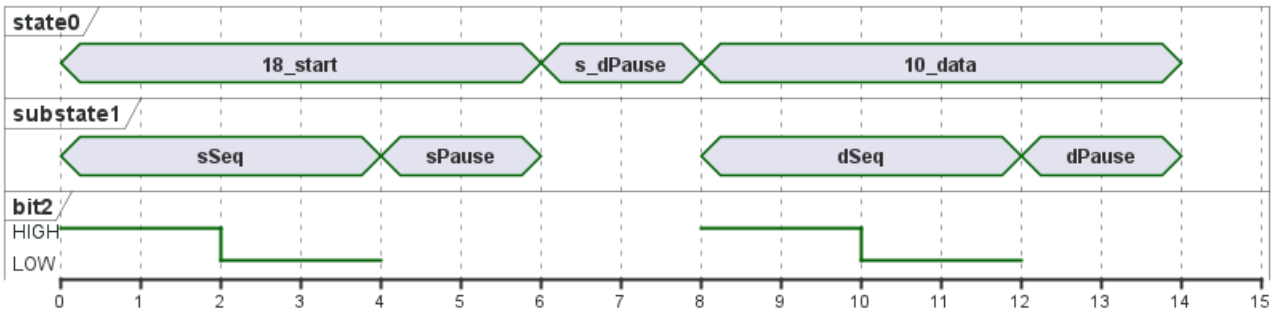
It is also possible to hide some state.

```
@startuml
concise "Web User" as WU

@0
WU is {-}

@100
WU is A1

@200
WU is {-}

@300
WU is {hidden}
```

```
@400
WU is A3

@500
WU is {-}
@enduml
```




```
@startuml
scale 1 as 50 pixels

concise state0
concise substate1
robust bit2

bit2 has HIGH,LOW

@state0
0 is 18_start
6 is s_dPause
8 is 10_data
14 is {hidden}

@substate1
0 is sSeq
4 is sPause
6 is {hidden}
8 is dSeq
12 is dPause
14 is {hidden}

@bit2
0 is HIGH
2 is LOW
4 is {hidden}
8 is HIGH
10 is LOW
12 is {hidden}
@enduml
```

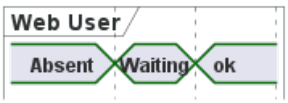


[Ref. QA-12222]

10.11 Hide time axis

It is possible to hide time axis.

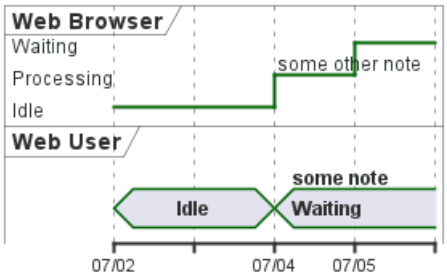
```
@startuml
hide time-axis
concise "Web User" as WU

WU is Absent

@WU
0 is Waiting
+500 is ok
@enduml
```



10.12 Using Time and Date

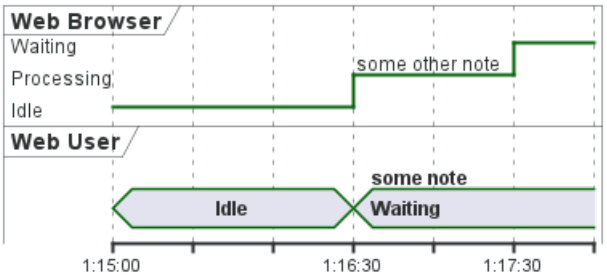
It is possible to use time or date.

```
@startuml
robust "Web Browser" as WB
concise "Web User" as WU

@2019/07/02
WU is Idle
WB is Idle

@2019/07/04
WU is Waiting : some note
WB is Processing : some other note

@2019/07/05
WB is Waiting
@enduml
```




```
@startuml
robust "Web Browser" as WB
concise "Web User" as WU

@1:15:00
WU is Idle
WB is Idle

@1:16:30
WU is Waiting : some note
WB is Processing : some other note
```

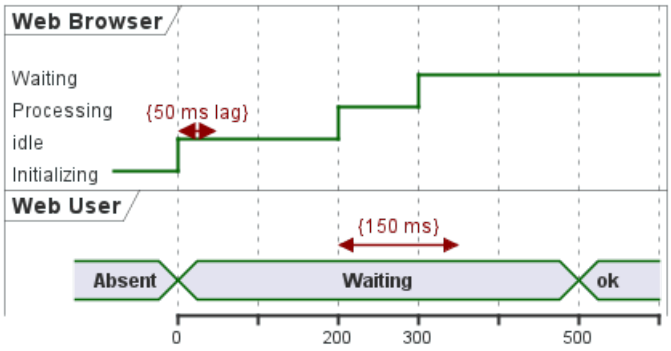
```
@1:17:30
WB is Waiting
@enduml
```



10.13 Adding constraint

It is possible to display time constraints on the diagrams.

```
@startuml
robust "Web Browser" as WB
concise "Web User" as WU

WB is Initializing
WU is Absent

@WB
0 is idle
+200 is Processing
+100 is Waiting
WB@0 <-> @50 : {50 ms lag}

@WU
0 is Waiting
+500 is ok
@200 <-> @+150 : {150 ms}
@enduml
```

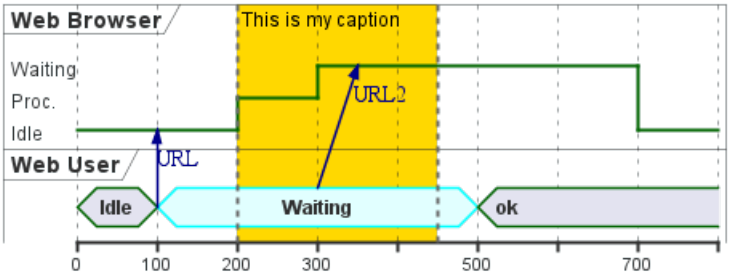


10.14 Zeitbereich hervorheben

Im Diagramm kann mit ”highlight” ein Zeitbereich definiert werden, der farblich hervorgehoben wird.

```
@startuml
robust "Web Browser" as WB
concise "Web User" as WU

@0
```

```
WU is Idle
WB is Idle

@100
WU -> WB : URL
WU is Waiting #LightCyan;line:Aqua

@200
WB is Proc.

@300
WU -> WB@350 : URL2
WB is Waiting

@+200
WU is ok

@+200
WB is Idle

highlight 200 to 450 #Gold;line:DimGrey : This is my caption
@enduml
```

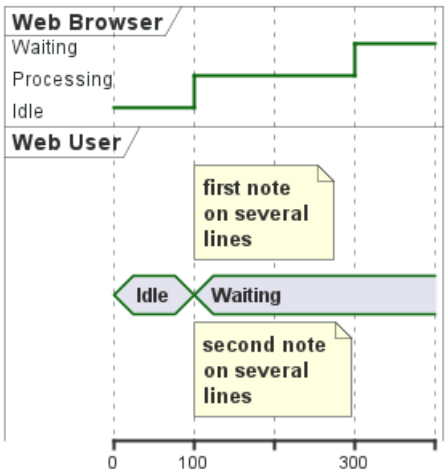


[Ref. QA-10868]

10.15 Using notes

You can use the `note top of` and `note bottom of` keywords to define notes related to a single object or participant *(available only for* `concise` *or* `binary` *object).*

```
@startuml
robust "Web Browser" as WB
concise "Web User" as WU

@0
WU is Idle
WB is Idle

@100
WU is Waiting
WB is Processing
note top of WU : first note\non several\nlines
note bottom of WU : second note\non several\nlines

@300
WB is Waiting
@enduml
```

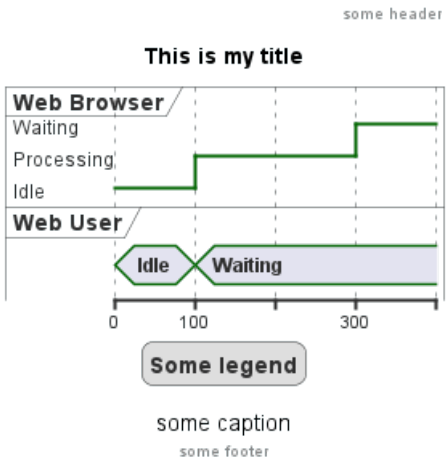


[Ref. QA-6877, GH-1465]

10.16 Adding texts

You can optionally add a title, a header, a footer, a legend and a caption:

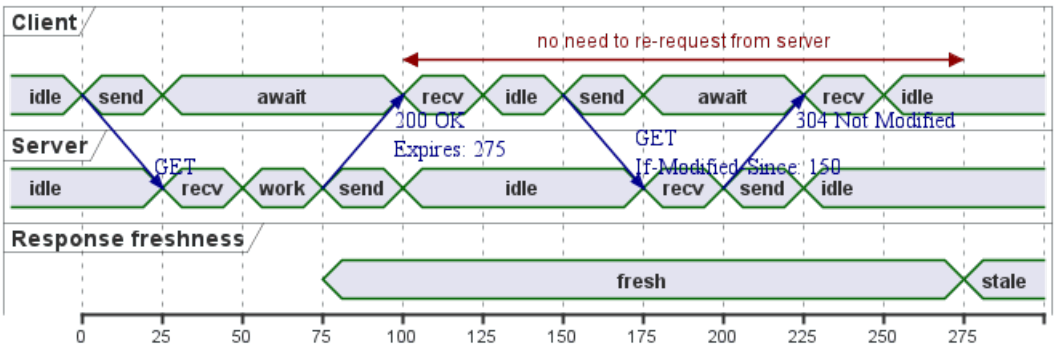
```
@startuml
Title This is my title
header: some header
footer: some footer
legend
Some legend
end legend
caption some caption

robust "Web Browser" as WB
concise "Web User" as WU

@0
WU is Idle
WB is Idle

@100
WU is Waiting
WB is Processing

@300
WB is Waiting
@enduml
```



10.17 Complete example

Thanks to Adam Rosien for this example.

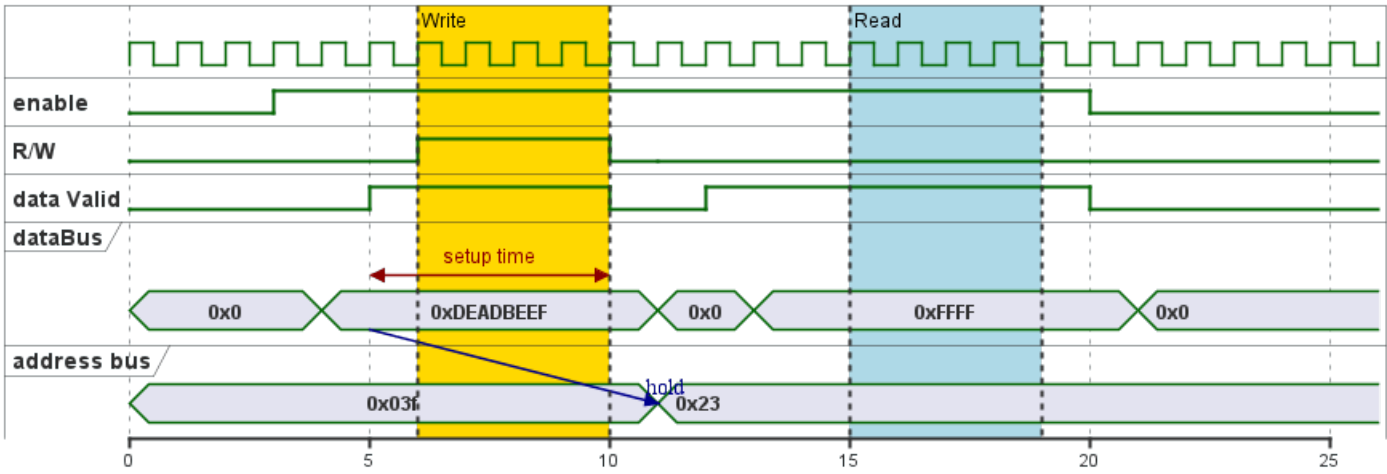
```
@startuml
concise "Client" as Client
concise "Server" as Server
concise "Response freshness" as Cache

Server is idle
Client is idle

@Client
0 is send
Client -> Server@+25 : GET
+25 is await
+75 is recv
+25 is idle
+25 is send
Client -> Server@+25 : GET\nIf-Modified-Since: 150
+25 is await
+50 is recv
+25 is idle
@100 <-> @275 : no need to re-request from server

@Server
25 is recv
+25 is work
+25 is send
Server -> Client@+25 : 200 OK\nExpires: 275
+25 is idle
+75 is recv
+25 is send
Server -> Client@+25 : 304 Not Modified
+25 is idle

@Cache
75 is fresh
+200 is stale
@enduml
```



10.18 Digitales Beispiel

```
@startuml
scale 5 as 150 pixels

clock clk with period 1
binary "enable" as en
binary "R/W" as rw
binary "data Valid" as dv
concise "dataBus" as db
concise "address bus" as addr

@6 as :write_beg
@10 as :write_end

@15 as :read_beg
@19 as :read_end


@0
en is low
db is "0x0"
addr is "0x03f"
rw is low
dv is 0

@:write_beg-3
 en is high
@:write_beg-2
 db is "0xDEADBEEF"
@:write_beg-1
dv is 1
@:write_beg
rw is high


@:write_end
rw is low
dv is low
@:write_end+1
rw is low
db is "0x0"
addr is "0x23"

@12
dv is high
```

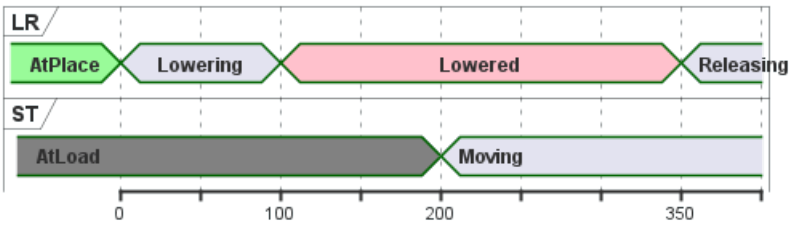
```
@13
db is "0xFFFF"

@20
en is low
dv is low
@21
db is "0x0"

highlight :write_beg to :write_end #Gold:Write
highlight :read_beg to :read_end #lightBlue:Read

db@:write_beg-1 <-> @:write_end : setup time
db@:write_beg-1 -> addr@:write_end+1 : hold
@enduml
```



10.19 Adding color

You can add color.

```
@startuml
concise "LR" as LR
concise "ST" as ST

LR is AtPlace #palegreen
ST is AtLoad #gray

@LR
0 is Lowering
100 is Lowered #pink
350 is Releasing

@ST
200 is Moving
@enduml
```

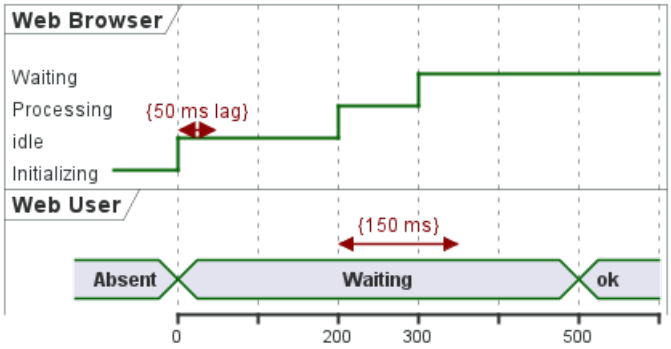


[Ref. QA-5776]

10.20 Using (global) style

10.20.1 Without style *(by default)*

```
@startuml
robust "Web Browser" as WB
concise "Web User" as WU

WB is Initializing
WU is Absent

@WB
0 is idle
+200 is Processing
+100 is Waiting
WB@0 <-> @50 : {50 ms lag}

@WU
0 is Waiting
+500 is ok
@200 <-> @+150 : {150 ms}
@enduml
```

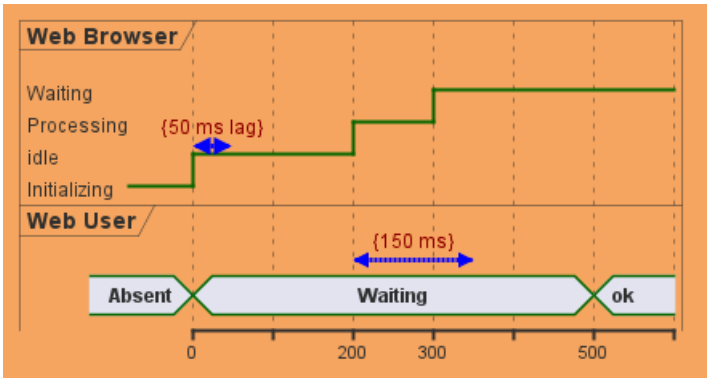


10.20.2 With style

You can use style to change rendering of elements.

```
@startuml
<style>
timingDiagram {
  document {
    BackGroundColor SandyBrown
  }
 constraintArrow {
  LineStyle 2-1
  LineThickness 3
  LineColor Blue
```

```
 }
}
</style>
robust "Web Browser" as WB
concise "Web User" as WU

WB is Initializing
WU is Absent

@WB
0 is idle
+200 is Processing
+100 is Waiting
WB@0 <-> @50 : {50 ms lag}

@WU
0 is Waiting
+500 is ok
@200 <-> @+150 : {150 ms}
@enduml
```



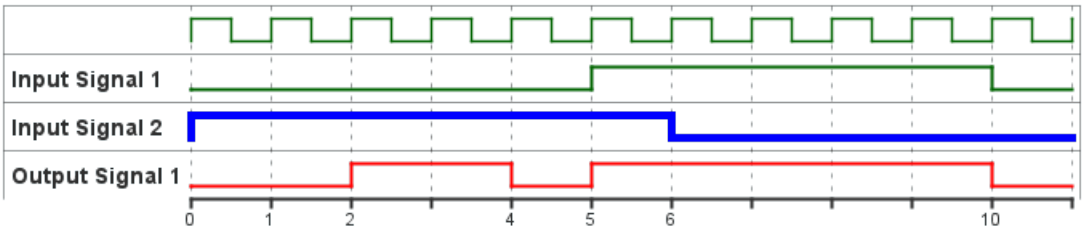
[Ref. QA-14340]

10.21 Applying Colors to specific lines

You can use the `<style>` tags and sterotyping to give a name to line attributes.

```
@startuml
<style>
timingDiagram {
  .red {
    LineColor red
  }
  .blue {
    LineColor blue
    LineThickness 5
  }
}
</style>

clock clk with period 1
binary "Input Signal 1"  as IS1
binary "Input Signal 2"  as IS2 <<blue>>
binary "Output Signal 1" as OS1 <<red>>

@0
IS1 is low
```

```
IS2 is high
OS1 is low
@2
OS1 is high
@4
OS1 is low
@5
IS1 is high
OS1 is high
@6
IS2 is low
@10
IS1 is low
OS1 is low
@enduml
```



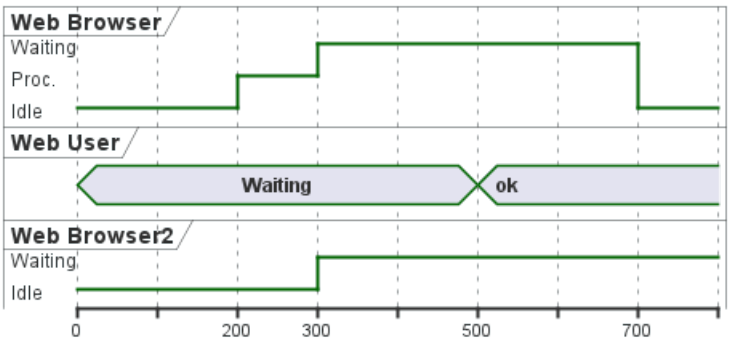
[Ref. QA-15870]

10.22 Compact mode

You can use `compact` command to compact the timing layout.

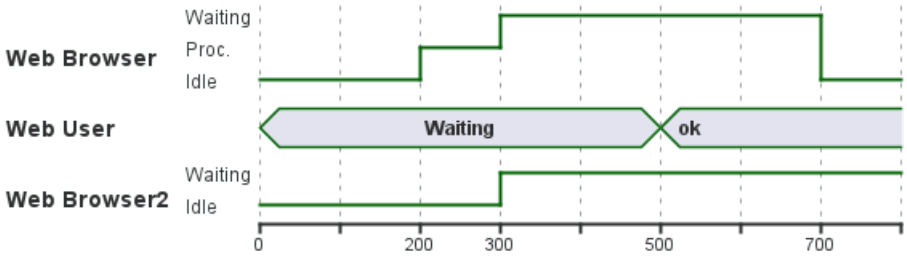
10.22.1 By default

```
@startuml
robust "Web Browser" as WB
concise "Web User" as WU
robust "Web Browser2" as WB2

@0
WU is Waiting
WB is Idle
WB2 is Idle

@200
WB is Proc.

@300
WB is Waiting
WB2 is Waiting

@500
WU is ok

@700
WB is Idle
@enduml
```



10.22.2 Global mode with `mode compact`

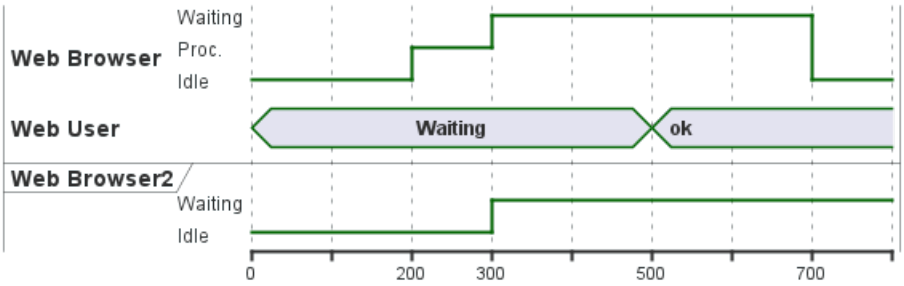
```
@startuml
mode compact
robust "Web Browser" as WB
concise "Web User" as WU
robust "Web Browser2" as WB2

@0
WU is Waiting
WB is Idle
WB2 is Idle

@200
WB is Proc.

@300
WB is Waiting
WB2 is Waiting

@500
WU is ok

@700
WB is Idle
@enduml
```



10.22.3 Local mode with only `compact` on element

```
@startuml
compact robust "Web Browser" as WB
compact concise "Web User" as WU
robust "Web Browser2" as WB2

@0
WU is Waiting
WB is Idle
```

```
WB2 is Idle

@200
WB is Proc.

@300
WB is Waiting
WB2 is Waiting

@500
WU is ok

@700
WB is Idle
@enduml
```



[Ref. QA-11130]

11 Display JSON Data

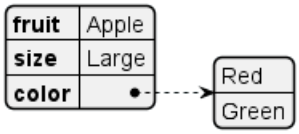
JSON format is widely used in software.

You can use PlantUML to visualize your data.

To activate this feature, the diagram must:

- begin with `@startjson` keyword
- end with `@endjson` keyword.

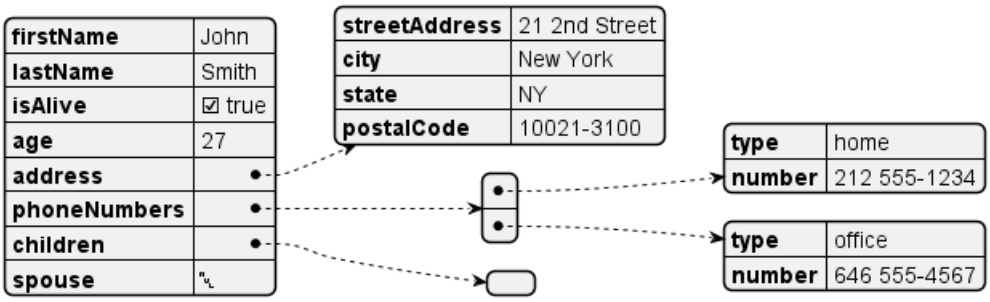
```
@startjson
{
   "fruit":"Apple",
   "size":"Large",
   "color": ["Red", "Green"]
}
@endjson
```



11.1 Complex example

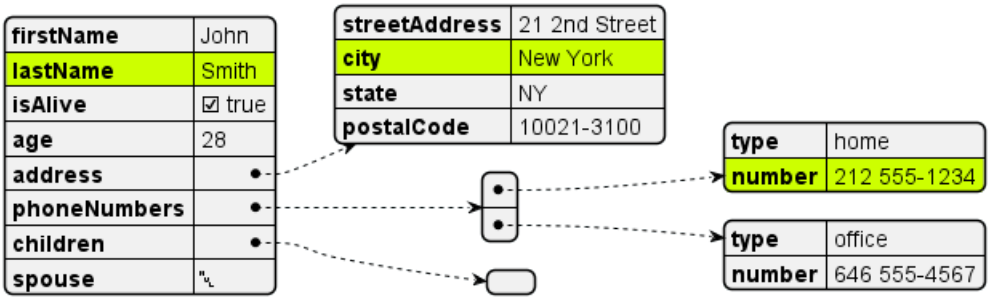
You can use complex JSON structure.

```
@startjson
{
  "firstName": "John",
  "lastName": "Smith",
  "isAlive": true,
  "age": 27,
  "address": {
    "streetAddress": "21 2nd Street",
    "city": "New York",
    "state": "NY",
    "postalCode": "10021-3100"
  },
  "phoneNumbers": [
    {
      "type": "home",
      "number": "212 555-1234"
    },
    {
      "type": "office",
      "number": "646 555-4567"
    }
  ],
  "children": [],
  "spouse": null
}
@endjson
```



11.2 Highlight parts

```
@startjson
#highlight "lastName"
#highlight "address" / "city"
#highlight "phoneNumbers" / "0" / "number"
{
  "firstName": "John",
  "lastName": "Smith",
  "isAlive": true,
  "age": 28,
  "address": {
    "streetAddress": "21 2nd Street",
    "city": "New York",
    "state": "NY",
    "postalCode": "10021-3100"
  },
  "phoneNumbers": [
    {
      "type": "home",
      "number": "212 555-1234"
    },
    {
      "type": "office",
      "number": "646 555-4567"
    }
  ],
  "children": [],
  "spouse": null
}
@endjson
```

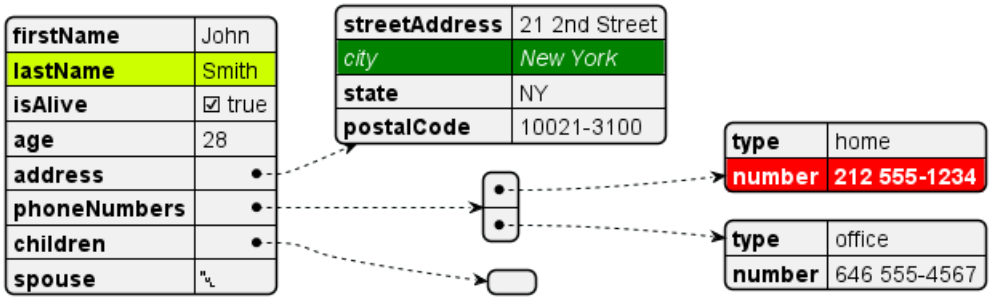


11.3 Using different styles for highlight

It is possible to have different styles for different highlights.

```
@startjson
```

```
<style>
  .h1 {
    BackGroundColor green
    FontColor white
    FontStyle italic
  }
  .h2 {
    BackGroundColor red
    FontColor white
    FontStyle bold
  }
</style>
#highlight "lastName"
#highlight "address" / "city" <<h1>>
#highlight "phoneNumbers" / "0" / "number" <<h2>>
{
  "firstName": "John",
  "lastName": "Smith",
  "isAlive": true,
  "age": 28,
  "address": {
    "streetAddress": "21 2nd Street",
    "city": "New York",
    "state": "NY",
    "postalCode": "10021-3100"
  },
  "phoneNumbers": [
    {
      "type": "home",
      "number": "212 555-1234"
    },
    {
      "type": "office",
      "number": "646 555-4567"
    }
  ],
  "children": [],
  "spouse": null
}
@endjson
```



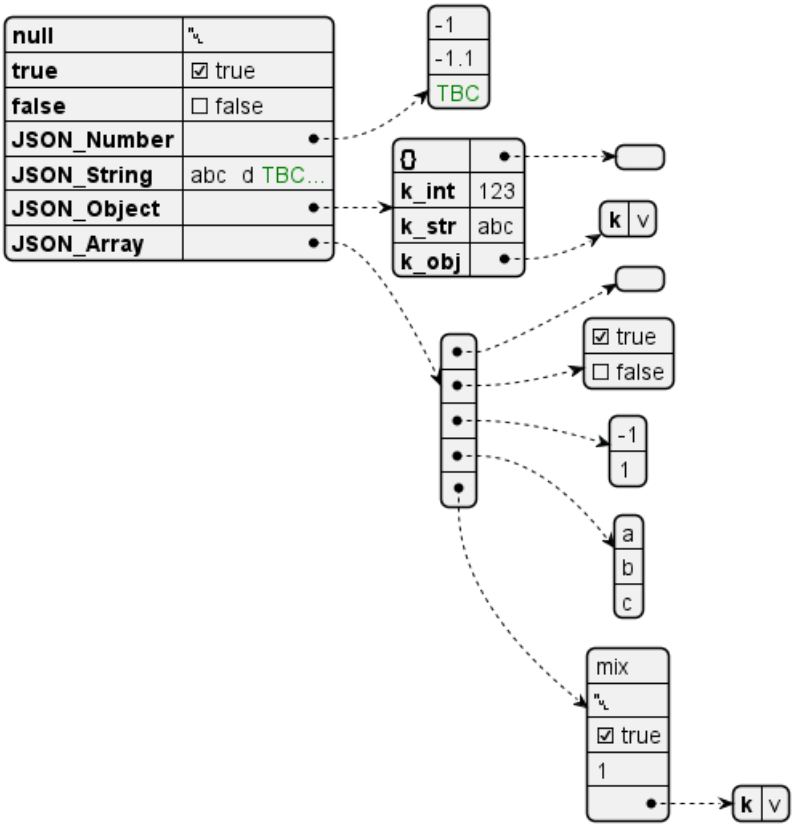
[Ref. QA-15756, GH-1393]

11.4 JSON basic element

11.4.1 Synthesis of all JSON basic element

```
@startjson
{
```

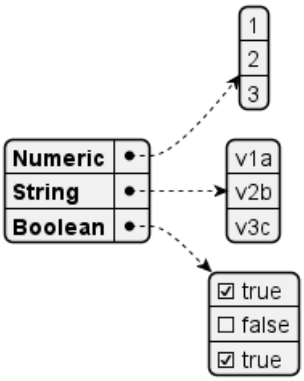
```
"null": null,
"true": true,
"false": false,
"JSON_Number": [-1, -1.1, "<color:green>TBC"],
"JSON_String": "a\nb\rc\td <color:green>TBC...",
"JSON_Object": {
  "{}": {},
  "k_int": 123,
  "k_str": "abc",
  "k_obj": {"k": "v"}
},
"JSON_Array" : [
  [],
  [true, false],
  [-1, 1],
  ["a", "b", "c"],
  ["mix", null, true, 1, {"k": "v"}]
]
}
@endjson
```



11.5 JSON array or table

11.5.1 Array type

```
@startjson
{
"Numeric": [1, 2, 3],
"String ": ["v1a", "v2b", "v3c"],
"Boolean": [true, false, true]
}
@endjson
```



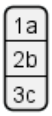
11.5.2 Minimal array or table

11.5.3 Number array

```
@startjson
[1, 2, 3]
@endjson
```

11.5.4 String array

```
@startjson
["1a", "2b", "3c"]
@endjson
```

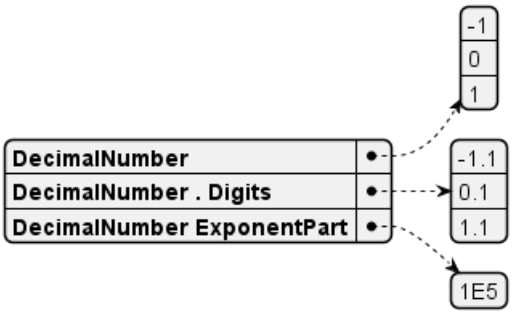


11.5.5 Boolean array

```
@startjson
[true, false, true]
@endjson
```

11.6 JSON numbers

```
@startjson
{
"DecimalNumber": [-1, 0, 1],
"DecimalNumber . Digits": [-1.1, 0.1, 1.1],
"DecimalNumber ExponentPart": [1E5]
}
@endjson
```



11.7 JSON strings

11.7.1 JSON Unicode

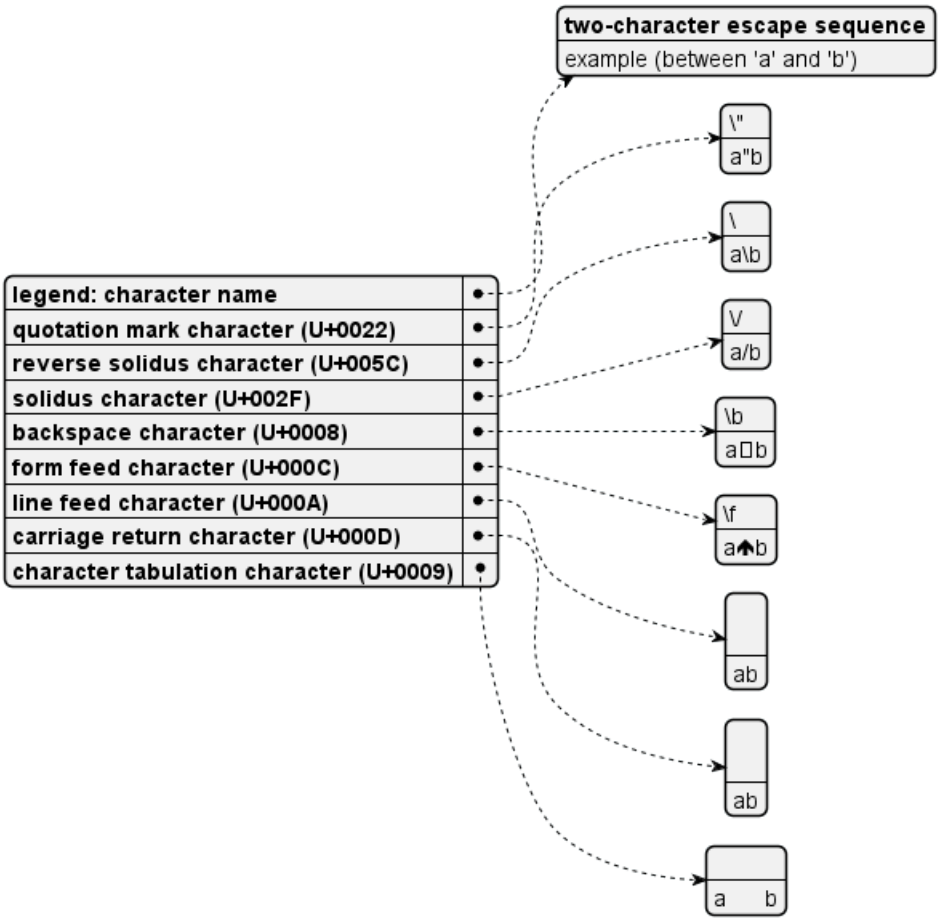
On JSON you can use Unicode directly or by using escaped form like .

```
@startjson
{
  "<color:blue><b>code": "<color:blue><b>value",
  "a\\u005Cb":            "a\u005Cb",
  "\\uD83D\\uDE10":       "\uD83D\uDE10",
  " ":                  " "
}
@endjson
```

code	value
a\u005Cb	a\b
\uD83D\uDE10	😐
😐	😐

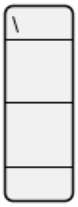
11.7.2 JSON two-character escape sequence

```
@startjson
{
 "**legend**: character name":                ["**two-character escape sequence**", "example (between
 "quotation mark character (U+0022)":         ["\\\"", "a\"b"],
 "reverse solidus character (U+005C)":        ["\\\\", "a\\b"],
 "solidus character (U+002F)":                ["\\\/", "a\/b"],
 "backspace character (U+0008)":              ["\\b", "a\bb"],
 "form feed character (U+000C)":              ["\\f", "a\fb"],
 "line feed character (U+000A)":              ["\\n", "a\nb"],
 "carriage return character (U+000D)":        ["\\r", "a\rb"],
 "character tabulation character (U+0009)":   ["\\t", "a\tb"]
}
@endjson
```



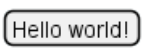
TODO: FIXME FIXME or not , on the same item as management in PlantUML *See Report Bug on QA-13066* **TODO:** FIXME

```
@startjson
[
"\\\\",
"\\n",
"\\r",
"\\t"
]
@endjson
```



11.8 Minimal JSON examples

```
@startjson
"Hello world!"
@endjson
```



```
@startjson
42
@endjson
```

```
@startjson
true
@endjson
```

(Examples come from STD 90 - Examples)

11.9 Empty table or list

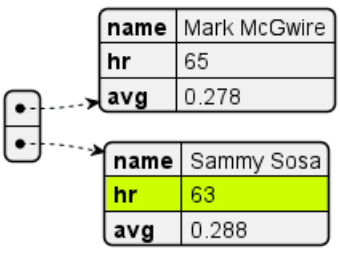
```
@startjson
{
  "empty_tab": [],
  "empty_list": {}
}
@endjson
```

[Ref. QA-14397]

11.10 Using (global) style

11.10.1 Without style *(by default)*

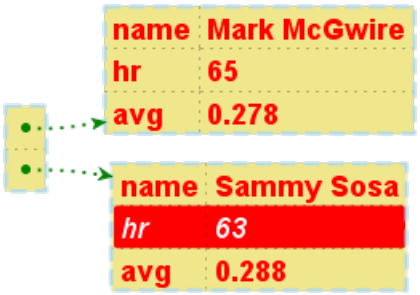
```
@startjson
#highlight "1" / "hr"
[
  {
    "name": "Mark McGwire",
    "hr":   65,
    "avg":  0.278
  },
  {
    "name": "Sammy Sosa",
    "hr":   63,
    "avg":  0.288
  }
]
@endjson
```



11.10.2 With style

You can use style to change rendering of elements.

```
@startjson
<style>
jsonDiagram {
  node {
    BackGroundColor Khaki
    LineColor lightblue
    FontName Helvetica
    FontColor red
    FontSize 18
    FontStyle bold
    RoundCorner 0
    LineThickness 2
    LineStyle 10-5
    separator {
      LineThickness 0.5
      LineColor black
      LineStyle 1-5
    }
  }
  arrow {
    BackGroundColor lightblue
    LineColor green
    LineThickness 2
    LineStyle 2-5
  }
  highlight {
    BackGroundColor red
    FontColor white
    FontStyle italic
  }
}
</style>
#highlight "1" / "hr"
[
  {
    "name": "Mark McGwire",
    "hr":   65,
    "avg":  0.278
  },
  {
    "name": "Sammy Sosa",
    "hr":   63,
    "avg":  0.288
  }
]
@endjson
```



[Adapted from QA-13123 and QA-13288]

11.11 Display JSON Data on Class or Object diagram

11.11.1 Simple example

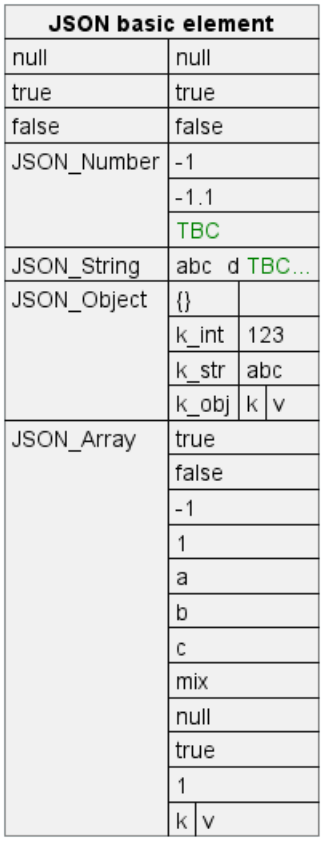
```
@startuml
class Class
object Object
json JSON {
   "fruit":"Apple",
   "size":"Large",
   "color": ["Red", "Green"]
}
@enduml
```

[Ref. QA-15481]

11.11.2 Complex example: with all JSON basic element

```
@startuml
json "<b>JSON basic element" as J {
"null": null,
"true": true,
"false": false,
"JSON_Number": [-1, -1.1, "<color:green>TBC"],
"JSON_String": "a\nb\rc\td <color:green>TBC...",
"JSON_Object": {
  "{}": {},
  "k_int": 123,
  "k_str": "abc",
  "k_obj": {"k": "v"}
},
"JSON_Array" : [
  [],
  [true, false],
  [-1, 1],
```

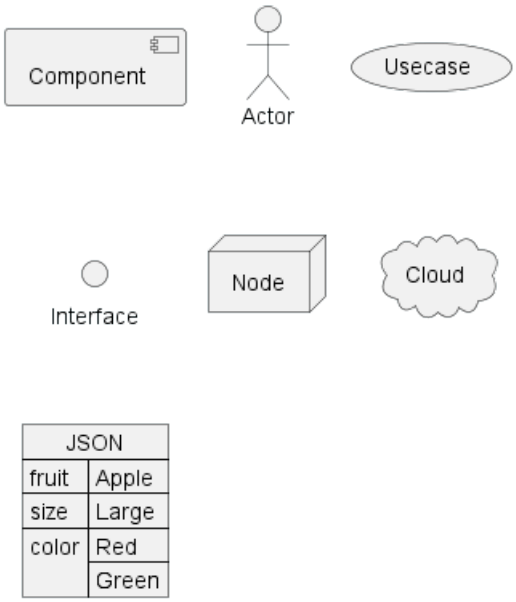
```
  ["a", "b", "c"],
  ["mix", null, true, 1, {"k": "v"}]
]
}
@enduml
```



11.12 Display JSON Data on Deployment (Usecase, Component, Deployment) diagram

11.12.1 Simple example

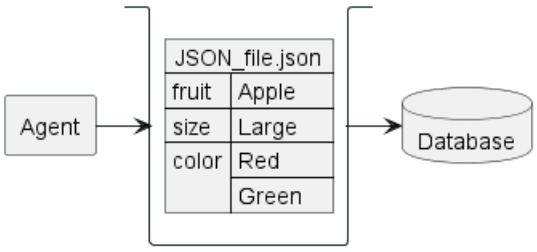
```
@startuml
allowmixing

component Component
actor     Actor
usecase   Usecase
()        Interface
node      Node
cloud     Cloud

json JSON {
   "fruit":"Apple",
   "size":"Large",
   "color": ["Red", "Green"]
}
@enduml
```



[Ref. QA-15481]

Complex example: with arrow

```
@startuml
allowmixing

agent Agent
stack {
  json "JSON_file.json" as J {
    "fruit":"Apple",
    "size":"Large",
    "color": ["Red", "Green"]
  }
}
database Database

Agent -> J
J -> Database
@enduml
```

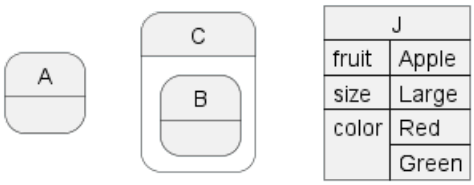


11.13 Display JSON Data on State diagram

11.13.1 Simple example

```
@startuml
state "A" as stateA
state "C" as stateC {
 state B
}
```

```
json J {
   "fruit":"Apple",
   "size":"Large",
   "color": ["Red", "Green"]
}
@enduml
```



[Ref. QA-17275]

12 Display YAML Data

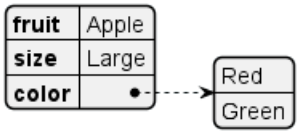
YAML format is widely used in software.

You can use PlantUML to visualize your data.

To activate this feature, the diagram must:

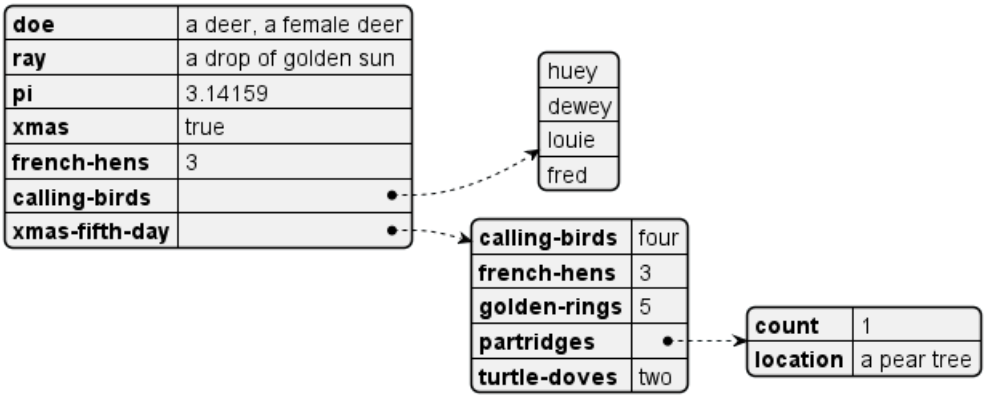
- begin with `@startyaml` keyword
- end with `@endyaml` keyword.

```
@startyaml
fruit: Apple
size: Large
color:
  - Red
  - Green
@endyaml
```



12.1 Complex example

```
@startyaml
doe: "a deer, a female deer"
ray: "a drop of golden sun"
pi: 3.14159
xmas: true
french-hens: 3
calling-birds:
- huey
- dewey
- louie
- fred
xmas-fifth-day:
calling-birds: four
french-hens: 3
golden-rings: 5
partridges:
count: 1
location: "a pear tree"
turtle-doves: two
@endyaml
```



12.2 Specific key (with symbols or unicode)

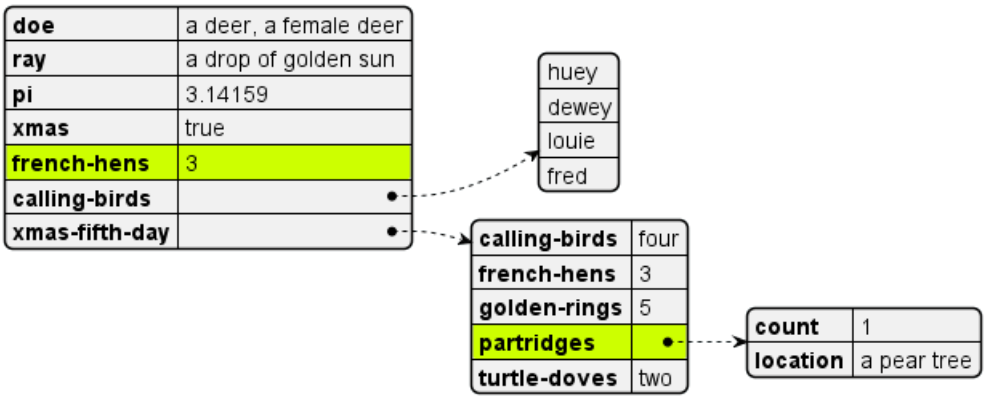
```
@startyaml
@fruit: Apple
$size: Large
&color: Red
 : Heart
%: Per mille
@endyaml
```

[Ref. QA-13376]

12.3 Highlight parts

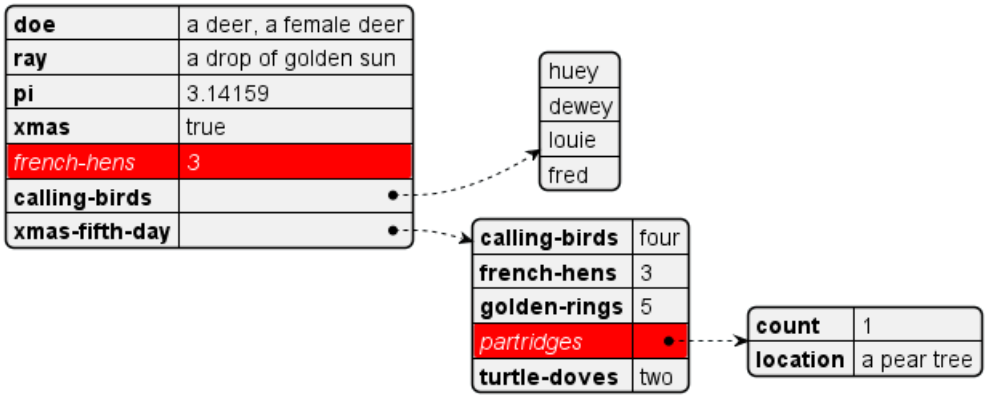
12.3.1 Normal style

```
@startyaml
#highlight "french-hens"
#highlight "xmas-fifth-day" / "partridges"

doe: "a deer, a female deer"
ray: "a drop of golden sun"
pi: 3.14159
xmas: true
french-hens: 3
calling-birds:
- huey
- dewey
- louie
- fred
xmas-fifth-day:
calling-birds: four
french-hens: 3
golden-rings: 5
partridges:
count: 1
location: "a pear tree"
turtle-doves: two
@endyaml
```



12.3.2 Customised style

```
@startyaml
<style>
yamlDiagram {
    highlight {
      BackGroundColor red
      FontColor white
      FontStyle italic
    }
}
</style>
#highlight "french-hens"
#highlight "xmas-fifth-day" / "partridges"

doe: "a deer, a female deer"
ray: "a drop of golden sun"
pi: 3.14159
xmas: true
french-hens: 3
calling-birds:
- huey
- dewey
- louie
- fred
xmas-fifth-day:
calling-birds: four
french-hens: 3
golden-rings: 5
partridges:
count: 1
location: "a pear tree"
turtle-doves: two
@endyaml
```



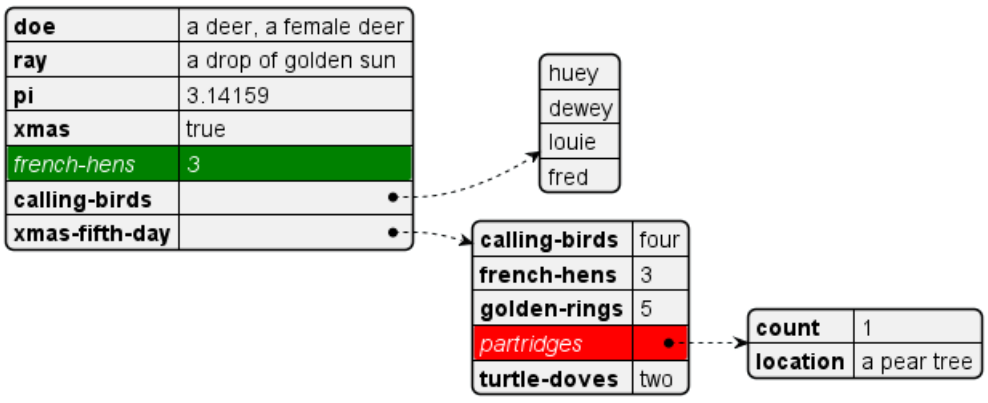
[Ref. QA-13288]

12.4 Using different styles for highlight

It is possible to have different styles for different highlights.

```
@startyaml
<style>
    .h1 {
      BackGroundColor green
      FontColor white
```

```
      FontStyle italic
    }
    .h2 {
      BackGroundColor red
      FontColor white
      FontStyle italic
    }
</style>
#highlight "french-hens" <<h1>>
#highlight "xmas-fifth-day" / "partridges" <<h2>>

doe: "a deer, a female deer"
ray: "a drop of golden sun"
pi: 3.14159
xmas: true
french-hens: 3
calling-birds:
- huey
- dewey
- louie
- fred
xmas-fifth-day:
calling-birds: four
french-hens: 3
golden-rings: 5
partridges:
count: 1
location: "a pear tree"
turtle-doves: two
@endyaml
```



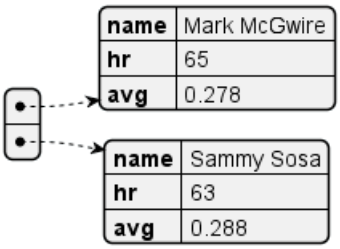
[Ref. QA-15756, GH-1393]

12.5 Using (global) style

12.5.1 Without style *(by default)*

```
@startyaml
  -
    name: Mark McGwire
    hr:   65
    avg:  0.278
  -
    name: Sammy Sosa
    hr:   63
```

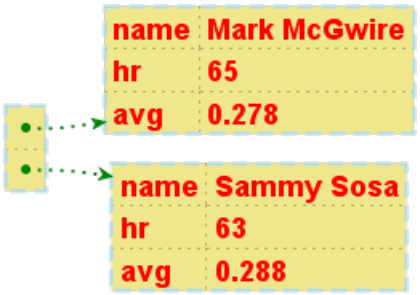
```
    avg:  0.288
@endyaml
```



12.5.2 With style

You can use style to change rendering of elements.

```
@startyaml
<style>
yamlDiagram {
  node {
    BackGroundColor lightblue
    LineColor lightblue
    FontName Helvetica
    FontColor red
    FontSize 18
    FontStyle bold
    BackGroundColor Khaki
    RoundCorner 0
    LineThickness 2
    LineStyle 10-5
    separator {
      LineThickness 0.5
      LineColor black
      LineStyle 1-5
    }
  }
  arrow {
    BackGroundColor lightblue
    LineColor green
    LineThickness 2
    LineStyle 2-5
  }
}
</style>
  -
    name: Mark McGwire
    hr:   65
    avg:  0.278
  -
    name: Sammy Sosa
    hr:   63
    avg:  0.288
@endyaml
```


name
Mark McGwire
hr
65
avg
0.278
name
Sammy Sosa
hr
63
avg
0.288

[Ref. QA-13123]

13 Network diagram (nwdiag)

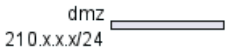
nwdiag has been created by Takeshi Komiya and allows to quickly draw network diagrams. So we thank him for his creation!

Since the syntax is clear and simple, this has been integrated within PlantUML. We reuse here the examples that Takeshi has documented.

13.1 Simple diagram

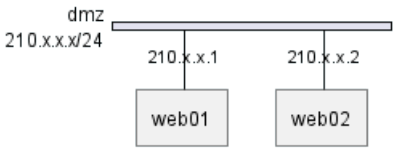
13.1.1 Define a network

```
@startuml
nwdiag {
  network dmz {
      address = "210.x.x.x/24"
  }
}
@enduml
```



13.1.2 Define some elements or servers on a network

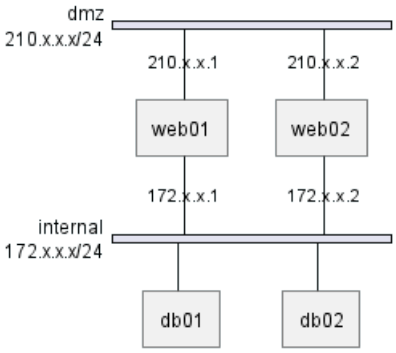
```
@startuml
nwdiag {
  network dmz {
      address = "210.x.x.x/24"

      web01 [address = "210.x.x.1"];
      web02 [address = "210.x.x.2"];
  }
}
@enduml
```



13.1.3 Full example

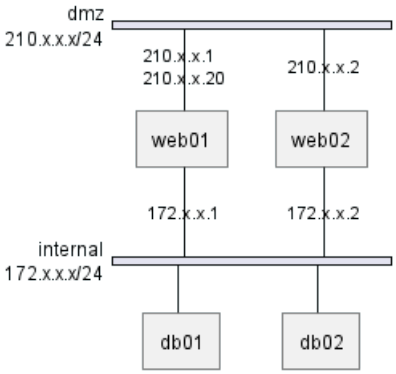
```
@startuml
nwdiag {
  network dmz {
      address = "210.x.x.x/24"

      web01 [address = "210.x.x.1"];
      web02 [address = "210.x.x.2"];
  }
  network internal {
      address = "172.x.x.x/24";

      web01 [address = "172.x.x.1"];
      web02 [address = "172.x.x.2"];
```

```
      db01;
      db02;
  }
}
@enduml
```



13.2 Define multiple addresses

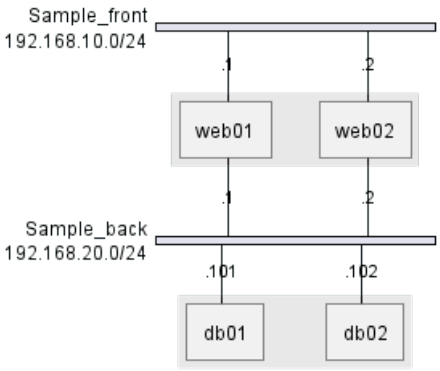
```
@startuml
nwdiag {
  network dmz {
      address = "210.x.x.x/24"

      // set multiple addresses (using comma)
      web01 [address = "210.x.x.1, 210.x.x.20"];
      web02 [address = "210.x.x.2"];
  }
  network internal {
      address = "172.x.x.x/24";

      web01 [address = "172.x.x.1"];
      web02 [address = "172.x.x.2"];
      db01;
      db02;
  }
}
@enduml
```



13.3 Grouping nodes

13.3.1 Define group inside network definitions

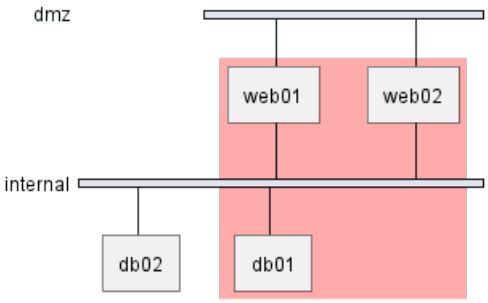
```
@startuml
nwdiag {
  network Sample_front {
    address = "192.168.10.0/24";

    // define group
    group web {
      web01 [address = ".1"];
      web02 [address = ".2"];
    }
  }
  network Sample_back {
    address = "192.168.20.0/24";
    web01 [address = ".1"];
    web02 [address = ".2"];
    db01 [address = ".101"];
    db02 [address = ".102"];

    // define network using defined nodes
    group db {
      db01;
      db02;
    }
  }
}
@enduml
```



13.3.2 Define group outside of network definitions

```
@startuml
nwdiag {
  // define group outside of network definitions
  group {
    color = "#FFAAAA";

    web01;
    web02;
    db01;
  }

  network dmz {
```

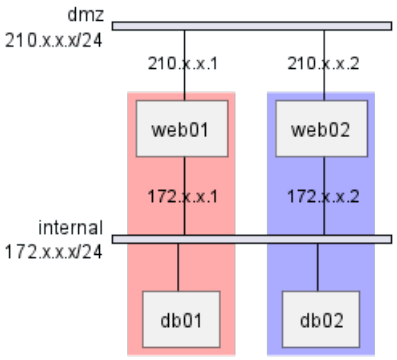
```
    web01;
    web02;
  }
  network internal {
    web01;
    web02;
    db01;
    db02;
  }
}
@enduml
```



13.3.3 Define several groups on same network

13.3.4 Example with 2 group

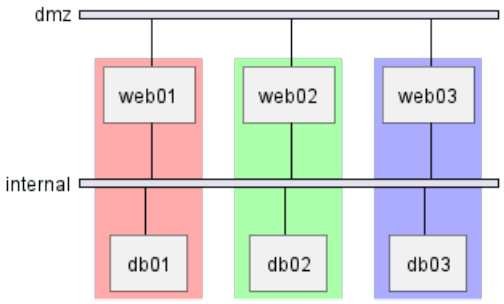
```
@startuml
nwdiag {
  group {
    color = "#FFaaaa";
    web01;
    db01;
  }
  group {
    color = "#aaaaFF";
    web02;
    db02;
  }
  network dmz {
      address = "210.x.x.x/24"

      web01 [address = "210.x.x.1"];
      web02 [address = "210.x.x.2"];
  }
  network internal {
      address = "172.x.x.x/24";

      web01 [address = "172.x.x.1"];
      web02 [address = "172.x.x.2"];
      db01 ;
      db02 ;
  }
}
@enduml
```



[Ref. QA-12663]

13.3.5 Example with 3 groups

```
@startuml
nwdiag {
  group {
    color = "#FFaaaa";
    web01;
    db01;
  }
  group {
    color = "#aaFFaa";
    web02;
    db02;
  }
  group {
    color = "#aaaaFF";
    web03;
    db03;
  }

  network dmz {
      web01;
      web02;
      web03;
  }
  network internal {
      web01;
      db01 ;
      web02;
      db02 ;
      web03;
      db03;
  }
}
@enduml
```



[Ref. QA-13138]

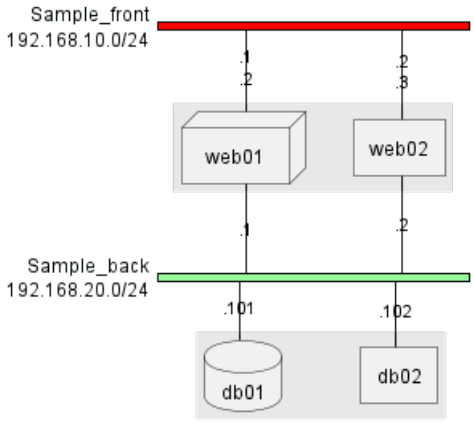
13.4 Extended Syntax (for network or group)

13.4.1 Network

For network or network's component, you can add or change:

- addresses *(separated by comma ,)*;
- color;
- description;
- shape.

```
@startuml
nwdiag {
  network Sample_front {
    address = "192.168.10.0/24"
    color = "red"

    // define group
    group web {
      web01 [address = ".1, .2", shape = "node"]
      web02 [address = ".2, .3"]
    }
  }
  network Sample_back {
    address = "192.168.20.0/24"
    color = "palegreen"
    web01 [address = ".1"]
    web02 [address = ".2"]
    db01 [address = ".101", shape = database ]
    db02 [address = ".102"]

    // define network using defined nodes
    group db {
      db01;
      db02;
    }
  }
}
@enduml
```

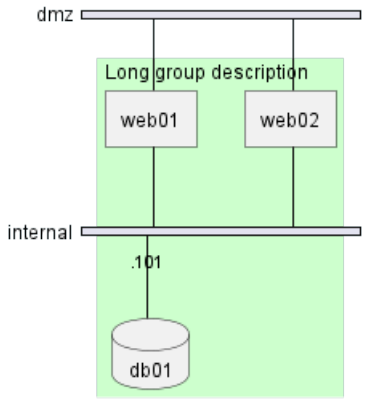


13.4.2 Group

For a group, you can add or change:

- color;
- description.

```
@startuml
nwdiag {
  group {
    color = "#CCFFCC";
    description = "Long group description";

    web01;
    web02;
    db01;
  }

  network dmz {
    web01;
    web02;
  }
  network internal {
    web01;
    web02;
    db01 [address = ".101", shape = database];
  }
}
@enduml
```



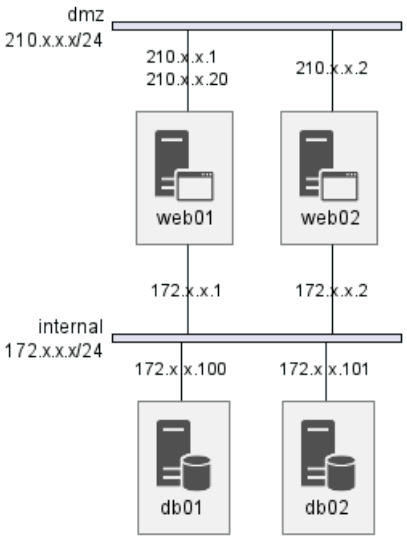
[Ref. QA-12056]

13.5 Using Sprites

You can use all sprites (icons) from the Standard Library or any other library.

Use the notation `<$sprite>` to use a sprite, \n to make a new line, or any other Creole syntax.

```
@startuml
!include <office/Servers/application_server>
!include <office/Servers/database_server>

nwdiag {
  network dmz {
      address = "210.x.x.x/24"

      // set multiple addresses (using comma)
      web01 [address = "210.x.x.1, 210.x.x.20",  description = "<$application_server>\n web01"]
      web02 [address = "210.x.x.2",  description = "<$application_server>\n web02"];
  }
  network internal {
      address = "172.x.x.x/24";

      web01 [address = "172.x.x.1"];
      web02 [address = "172.x.x.2"];
      db01 [address = "172.x.x.100",  description = "<$database_server>\n db01"];
      db02 [address = "172.x.x.101",  description = "<$database_server>\n db02"];
  }
}
@enduml
```



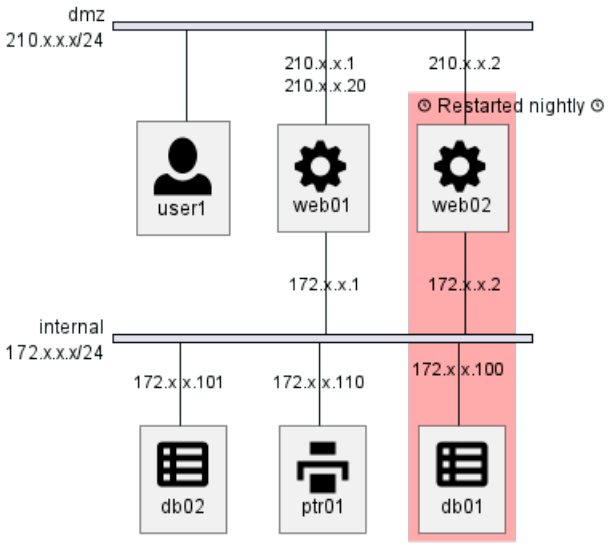
[Ref. QA-11862]

13.6 Using OpenIconic

You can also use the icons from OpenIconic in network or node descriptions.

Use the notation `<&icon>` to make an icon, `<&icon*n>` to multiply the size by a factor `n`, and to make a newline:

```
@startuml

nwdiag {
  group nightly {
    color = "#FFAAAA";
    description = "<&clock> Restarted nightly <&clock>";
    web02;
    db01;
  }
  network dmz {
      address = "210.x.x.x/24"

      user [description = "<&person*4.5>\n user1"];
      // set multiple addresses (using comma)
      web01 [address = "210.x.x.1, 210.x.x.20",  description = "<&cog*4>\nweb01"]
      web02 [address = "210.x.x.2",  description = "<&cog*4>\nweb02"];

  }
  network internal {
      address = "172.x.x.x/24";

      web01 [address = "172.x.x.1"];
      web02 [address = "172.x.x.2"];
      db01 [address = "172.x.x.100",  description = "<&spreadsheet*4>\n db01"];
      db02 [address = "172.x.x.101",  description = "<&spreadsheet*4>\n db02"];
      ptr  [address = "172.x.x.110",  description = "<&print*4>\n ptr01"];
  }
}
@enduml
```

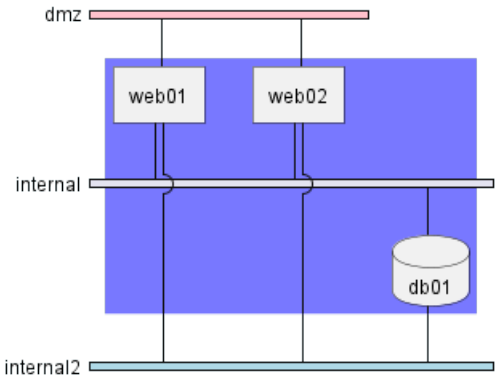


13.7 Same nodes on more than two networks

You can use same nodes on different networks (more than two networks); *nwdiag* use in this case *'jump line'* over networks.

```
@startuml
nwdiag {
  // define group at outside network definitions
  group {
    color = "#7777FF";

    web01;
    web02;
    db01;
  }

  network dmz {
    color = "pink"

    web01;
    web02;
  }

  network internal {
    web01;
    web02;
    db01 [shape = database ];
  }

  network internal2 {
    color = "LightBlue";

    web01;
    web02;
    db01;
  }

}
```

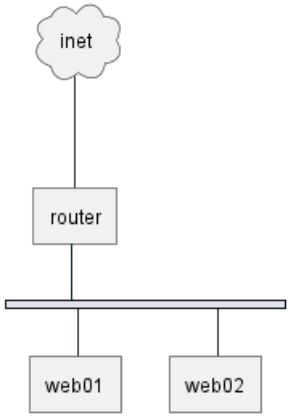
```
@enduml
```



13.8 Peer networks

Peer networks are simple connections between two nodes, for which we don't use a horizontal "busbar" network

```
@startuml
nwdiag {
  inet [shape = cloud];
  inet -- router;

  network {
    router;
    web01;
    web02;
  }
}
@enduml
```

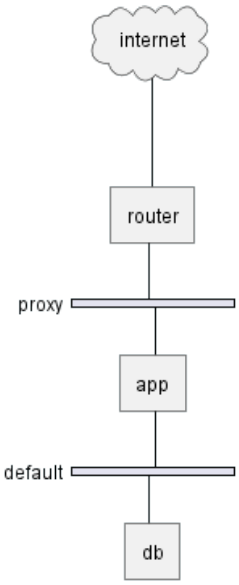


13.9 Peer networks and group

13.9.1 Without group

```
@startuml
nwdiag {
    internet [ shape = cloud];
```

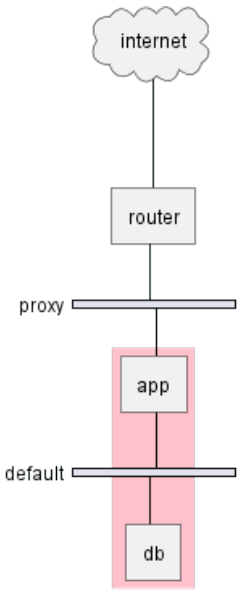
```
    internet -- router;

    network proxy {
        router;
        app;
    }
    network default {
     app;
        db;
    }
}
@enduml
```



13.9.2 Group on first

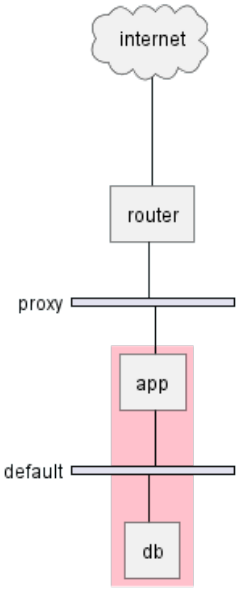
```
@startuml
nwdiag {
    internet [ shape = cloud];
    internet -- router;

    group {
      color = "pink";
      app;
      db;
    }

    network proxy {
        router;
        app;
    }

    network default {
     app;
        db;
    }
}
```

```
@enduml
```



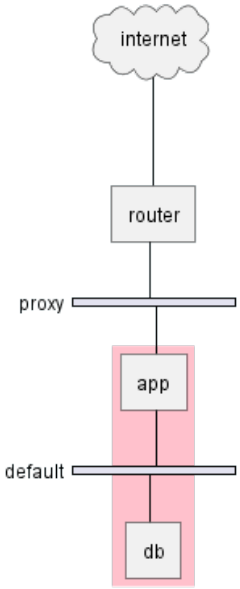
13.9.3 Group on second

```
@startuml
nwdiag {
    internet [ shape = cloud];
    internet -- router;

    network proxy {
        router;
        app;
    }

    group {
      color = "pink";
      app;
      db;
    }

    network default {
     app;
        db;
    }
}
@enduml
```



13.9.4 Group on third

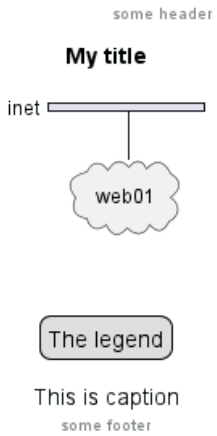
```
@startuml
nwdiag {
    internet [ shape = cloud];
    internet -- router;

    network proxy {
        router;
        app;
    }
    network default {
     app;
        db;
    }
    group {
      color = "pink";
      app;
      db;
    }
}
@enduml
```



[Ref. Issue#408 and QA-12655]

13.10 Add title, caption, header, footer or legend on network diagram

```
@startuml

header some header

footer some footer

title My title

nwdiag {
  network inet {
      web01 [shape = cloud]
  }
}

legend
The legend
end legend

caption This is caption
@enduml
```

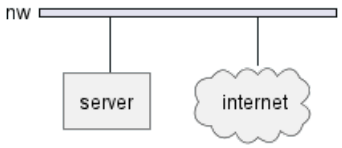


[Ref. QA-11303 and Common commands]

13.11 With or without shadow

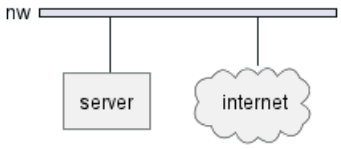
13.11.1 With shadow (by default)

```
@startuml
nwdiag {
  network nw {
    server;
    internet;
  }
  internet [shape = cloud];
}
@enduml
```



13.11.2 Without shadow

```
@startuml
<style>
root {
 shadowing 0
}
</style>
nwdiag {
  network nw {
    server;
    internet;
  }
  internet [shape = cloud];
}
@enduml
```



[Ref. QA-14516]

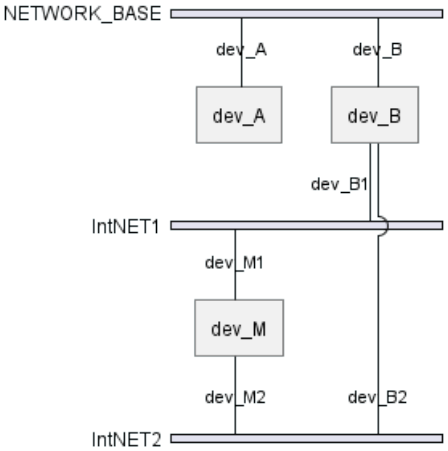
13.12 Change width of the networks

You can change the width of the networks, especially in order to have the same full width for only some or all networks.

Here are some examples, with all the possibilities:

- without

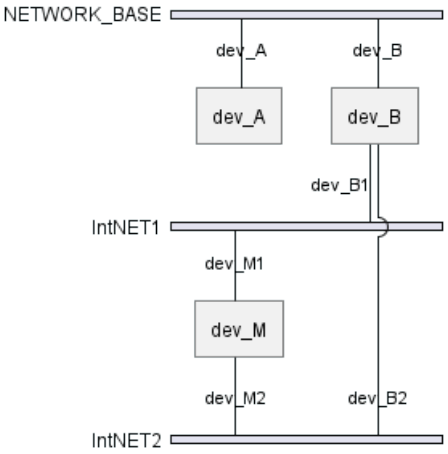
```
@startuml
nwdiag {
  network NETWORK_BASE {
   dev_A [address = "dev_A" ]
   dev_B [address = "dev_B" ]
  }
  network IntNET1 {
   dev_B [address = "dev_B1" ]
   dev_M [address = "dev_M1" ]
  }
  network IntNET2 {
   dev_B [address = "dev_B2" ]
   dev_M [address = "dev_M2" ]
 }
}
@enduml
```



- only the first

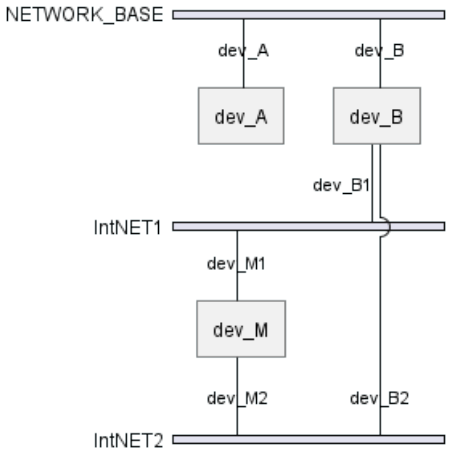
```
@startuml
nwdiag {
  network NETWORK_BASE {
   width = full
   dev_A [address = "dev_A" ]
   dev_B [address = "dev_B" ]
```

```
  }
  network IntNET1 {
   dev_B [address = "dev_B1" ]
   dev_M [address = "dev_M1" ]
  }
  network IntNET2 {
   dev_B [address = "dev_B2" ]
   dev_M [address = "dev_M2" ]
 }
}
@enduml
```



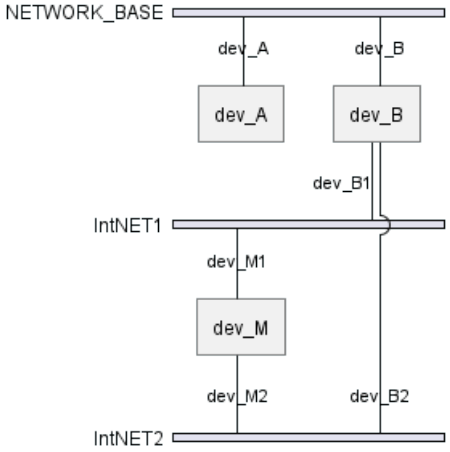
- the first and the second

```
@startuml
nwdiag {
  network NETWORK_BASE {
   width = full
   dev_A [address = "dev_A" ]
   dev_B [address = "dev_B" ]
  }
  network IntNET1 {
   width = full
   dev_B [address = "dev_B1" ]
   dev_M [address = "dev_M1" ]
  }
  network IntNET2 {
   dev_B [address = "dev_B2" ]
   dev_M [address = "dev_M2" ]
 }
}
@enduml
```



- all the network (with same full width)

```
@startuml
nwdiag {
  network NETWORK_BASE {
   width = full
   dev_A [address = "dev_A" ]
   dev_B [address = "dev_B" ]
  }
  network IntNET1 {
   width = full
   dev_B [address = "dev_B1" ]
   dev_M [address = "dev_M1" ]
  }
  network IntNET2 {
   width = full
   dev_B [address = "dev_B2" ]
   dev_M [address = "dev_M2" ]
 }
}
@enduml
```

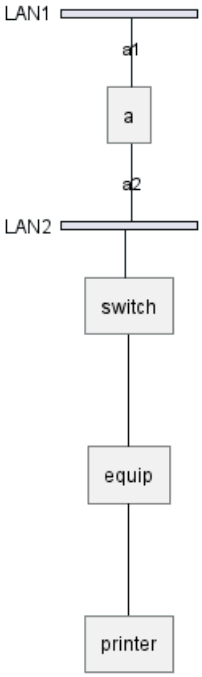


13.13 Other internal networks

You can define other internal networks (TCP/IP, USB, SERIAL,...).

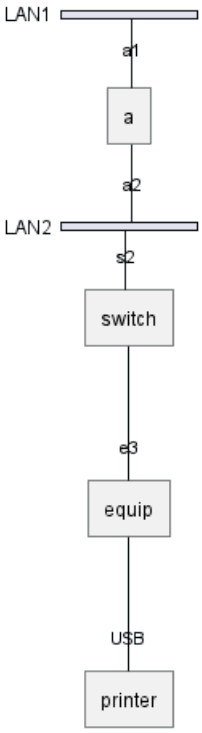
- Without address or type

```
@startuml
nwdiag {
  network LAN1 {
     a [address = "a1"];
  }
  network LAN2 {
     a [address = "a2"];
     switch;
  }
  switch -- equip;
  equip -- printer;
}
@enduml
```



- With address or type

```
@startuml
nwdiag {
  network LAN1 {
     a [address = "a1"];
  }
  network LAN2 {
     a [address = "a2"];
     switch [address = "s2"];
  }
  switch -- equip;
  equip [address = "e3"];
  equip -- printer;
  printer [address = "USB"];
}
@enduml
```

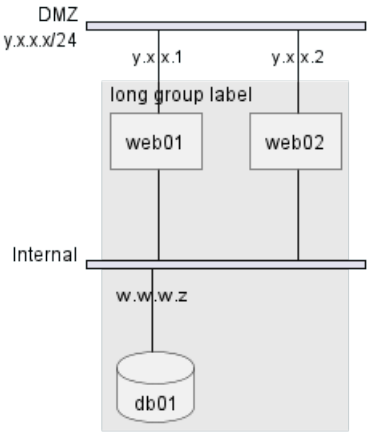


[Ref. QA-12824]

13.14 Using (global) style

13.14.1 Without style *(by default)*

```
@startuml
nwdiag {
  network DMZ {
      address = "y.x.x.x/24"
      web01 [address = "y.x.x.1"];
      web02 [address = "y.x.x.2"];
  }

   network Internal {
    web01;
    web02;
    db01 [address = "w.w.w.z", shape = database];
  }

    group {
    description = "long group label";
    web01;
    web02;
    db01;
  }
}
@enduml
```

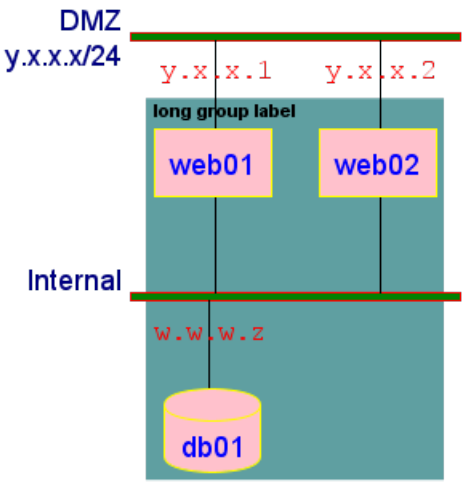


13.14.2 With style

You can use style to change rendering of elements.

```
@startuml
<style>
nwdiagDiagram {
  network {
    BackGroundColor green
    LineColor red
    LineThickness 1.0
    FontSize 18
    FontColor navy
  }
  server {
    BackGroundColor pink
    LineColor yellow
    LineThickness 1.0
    ' FontXXX only for description or label
    FontSize 18
    FontColor #blue
  }
  arrow {
    ' FontXXX only for address
    FontSize 17
    FontColor #red
    FontName Monospaced
    LineColor black
  }
  group {
    BackGroundColor cadetblue
    LineColor black
    LineThickness 2.0
    FontSize 11
    FontStyle bold
    Margin 5
    Padding 5
  }
}
</style>
nwdiag {
```

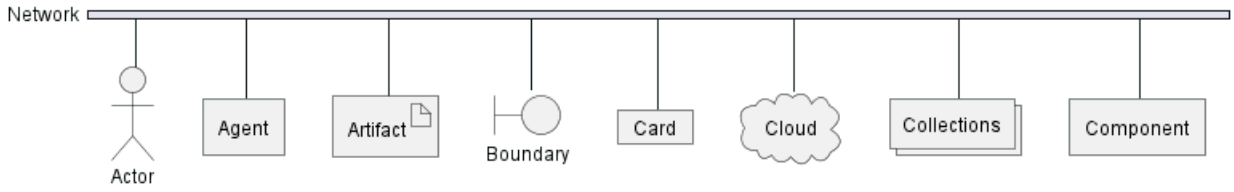
```
  network DMZ {
      address = "y.x.x.x/24"
      web01 [address = "y.x.x.1"];
      web02 [address = "y.x.x.2"];
  }

   network Internal {
    web01;
    web02;
    db01 [address = "w.w.w.z", shape = database];
  }

    group {
    description = "long group label";
    web01;
    web02;
    db01;
  }
}
@enduml
```



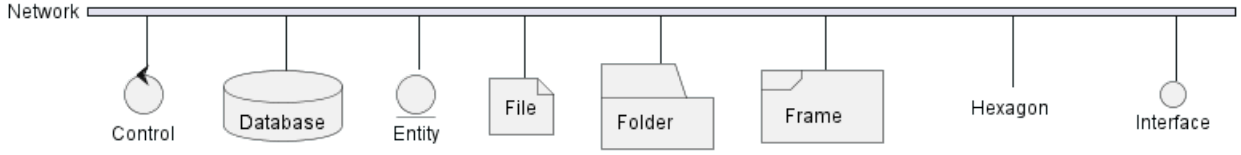
[Ref. QA-14479]

13.15 Appendix: Test of all shapes on Network diagram (nwdiag)

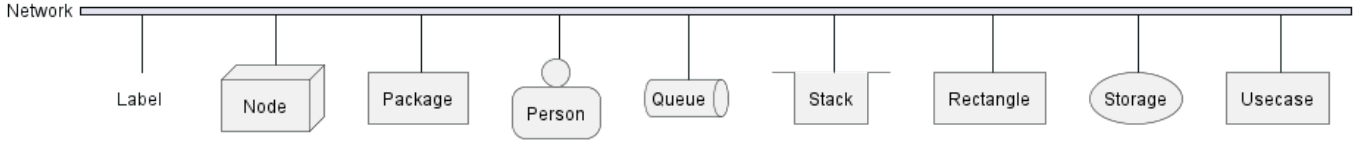
```
@startuml
nwdiag {
  network Network {
    Actor       [shape = actor]
    Agent       [shape = agent]
    Artifact    [shape = artifact]
    Boundary    [shape = boundary]
    Card        [shape = card]
    Cloud       [shape = cloud]
    Collections [shape = collections]
    Component   [shape = component]
  }
}
@enduml
```




```
@startuml
nwdiag {
  network Network {
    Control     [shape = control]
    Database    [shape = database]
    Entity      [shape = entity]
    File        [shape = file]
    Folder      [shape = folder]
    Frame       [shape = frame]
    Hexagon     [shape = hexagon]
    Interface   [shape = interface]
  }
}
@enduml
```

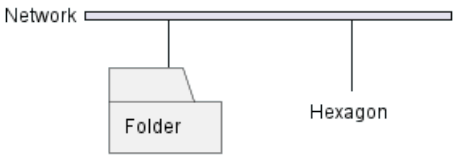



```
@startuml
nwdiag {
  network Network {
    Label       [shape = label]
    Node        [shape = node]
    Package     [shape = package]
    Person      [shape = person]
    Queue       [shape = queue]
    Stack       [shape = stack]
    Rectangle   [shape = rectangle]
    Storage     [shape = storage]
    Usecase     [shape = usecase]
  }
}
@enduml
```



TODO: FIXME ol olli level 0 Overlap of label for folder olli olli level 0 Hexagon shape is missing olli ol

```
@startuml
nwdiag {
network Network {
Folder [shape = folder]
Hexagon [shape = hexagon]
}
}
@enduml
```




```
@startuml
nwdiag {
network Network {
Folder [shape = folder, description = "Test, long long label\nTest, long long label"]
Hexagon [shape = hexagon, description = "Test, long long label\nTest, long long label"]
}
}
@enduml
```

TODO: FIXME

14 Salt

Salt ist ein Unterprojekt, das in PlantUML enthalten ist und das beim Entwickeln von graphischen Oberflächen nützlich ist.

Man kann entweder das Schlüsselwort `@startsalt` oder `@startuml` gefolgt von einer Zeile mit dem Schlüsselwort `salt` verwenden.

14.1 Standard-Steuerelemente

Ein Fenster muss mit einer geschweiften Klammer beginnen und enden. Darin kann folgendes definiert werden:

- ein Button mit `[` und `]`.
- Radio-Button mit `(` und `)`.
- eine Checkbox mit `[` und `]`.
- Freitextfeld mit `"`.

```
@startsalt
{
  Just plain text
  [This is my button]
  ()  Unchecked radio
  (X) Checked radio
  []  Unchecked box
  [X] Checked box
  "Enter text here   "
  ^This is a droplist^
}
@endsalt
```

Das Ziel dieses Werkzeugs ist das Darstellung von einfachen und Beispiel-Fenstern.

14.2 Text area

Here is an attempt to create a text area:

```
@startsalt
{+
   This is a long
   text in a textarea
   .
   "                           "
}
@endsalt
```

Note:

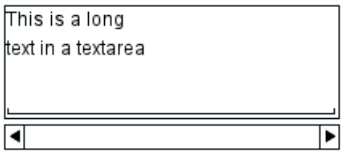
- the dot (`.`) to fill up vertical space;
- the last line of space (`"  "`) to make the area wider.

[Ref. QA-14765]

Then you can add scroll bar:

```
@startsalt
{SI
   This is a long
   text in a textarea
   .
   "                          "
}
@endsalt
```

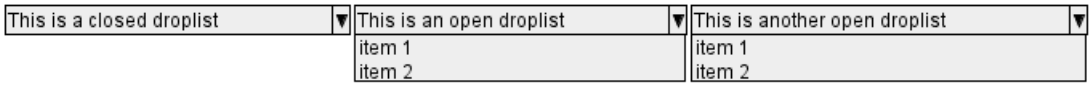
```
@startsalt
{S-
   This is a long
   text in a textarea
   .
   "                          "
}
@endsalt
```



14.3 Open, close droplist

You can open a droplist, by adding values enclosed by `^`, as:

```
@startsalt
{
  ^This is a closed droplist^ |
  ^This is an open droplist^^ item 1^^ item 2^ |
  ^This is another open droplist^ item 1^ item 2^
}
@endsalt
```



[Ref. QA-4184]

14.4 Nutzung von Gittern

Eine Tabelle wird automatisch erstellt, wenn ein öffnende Klammer `{` benutzt wird.

Zum trennen von Spalten wird `|` verwendet.

Ein Bespiel:

```
@startsalt
{
```

```
  Login    | "MyName   "
  Password | "****     "
  [Cancel] | [  OK   ]
}
@endsalt
```

Gleich nach der öffnenden Klammer kann durch das erste Zeichen angegeben werden, ob die Linien des Gitters gezeichnet werden sollen:

Symbol	Result
#	Um alle senkrechten und waagerechten Linien anzuzeigen
!	Alle senkrechten Linien
-	Alle waagerechten Linien
+	Alle äusseren Linien

```
@startsalt
{+
  Login    | "MyName   "
  Password | "****     "
  [Cancel] | [  OK   ]
}
@endsalt
```

14.5 Group box [^]

```
@startsalt
{^"My group box"
  Login    | "MyName   "
  Password | "****     "
  [Cancel] | [  OK   ]
}
@endsalt
```

[Ref. QA-5840]

14.6 Verwendung von Trennern

Sie können mehrere horizontale Linien als Trenner verwenden.

```
@startsalt
{
  Text1
  ..
  "Some field"
  ==
  Note on usage
  ~~
```

```
  Another text
  --
  [Ok]
}
@endsalt
```

14.7 Baum Widget (Tree Widget)

Um einen Baum zu erhalten, beginnen Sie mit `{T` und verwenden `+` um die Hierarchie Tiefe zu kennzeichnen.

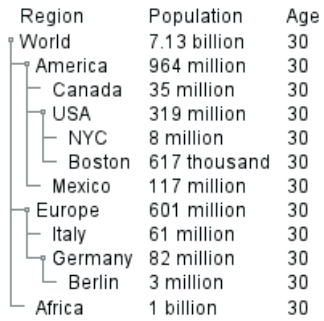
```
@startsalt
{
{T
 + World
 ++ America
 +++ Canada
 +++ USA
 ++++ New York
 ++++ Boston
 +++ Mexico
 ++ Europe
 +++ Italy
 +++ Germany
 ++++ Berlin
 ++ Africa
}
}
@endsalt
```

14.8 Tree table [T]

You can combine trees with tables.

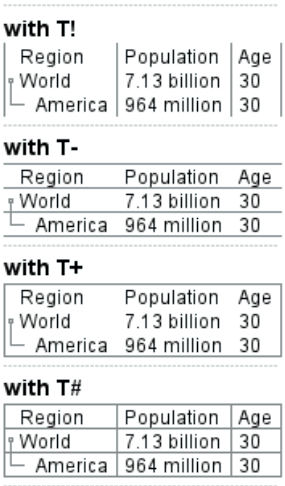
```
@startsalt
{
{T
+Region        | Population    | Age
+ World        | 7.13 billion  | 30
++ America     | 964 million   | 30
+++ Canada     | 35 million    | 30
+++ USA        | 319 million   | 30
```

```
++++ NYC        | 8 million      | 30
++++ Boston     | 617 thousand   | 30
+++ Mexico      | 117 million    | 30
++ Europe       | 601 million    | 30
+++ Italy       | 61 million     | 30
+++ Germany     | 82 million     | 30
++++ Berlin     | 3 million      | 30
++ Africa       | 1 billion      | 30
}
}
@endsalt
```



And add lines.

```
@startsalt
{
..
== with T!
{T!
+Region         | Population     | Age
+ World         | 7.13 billion   | 30
++ America      | 964 million    | 30
}
..
== with T-
{T-
+Region         | Population     | Age
+ World         | 7.13 billion   | 30
++ America      | 964 million    | 30
}
..
== with T+
{T+
+Region         | Population     | Age
+ World         | 7.13 billion   | 30
++ America      | 964 million    | 30
}
..
== with T#
{T#
+Region         | Population     | Age
+ World         | 7.13 billion   | 30
++ America      | 964 million    | 30
}
..
}
@endsalt
```

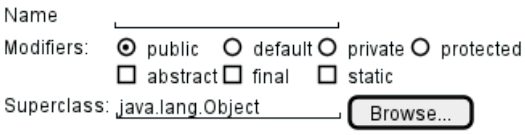


[Ref. QA-1265]

14.9 Klammerung

Subelemente können durch Klammern definiert werden.

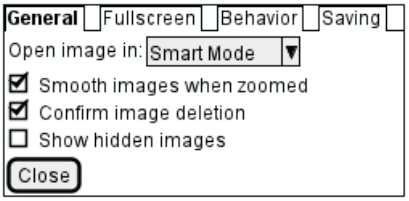
```
@startsalt
{
Name          | "                    "
Modifiers:    | { (X) public | () default | () private | () protected
                  [] abstract | [] final   | [] static }
Superclass:   | { "java.lang.Object " | [Browse...] }
}
@endsalt
```



14.10 Hinzufügen von Reitern

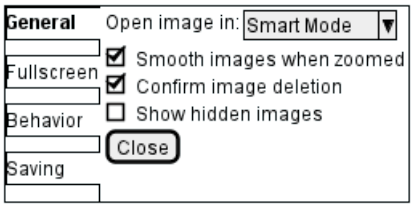
Sie können Reiter durch die `{/` Notation hinzufügen. Durch HTML Befehle können Sie auch Fettdruck erstellen.

```
@startsalt
{+
{/ <b>General | Fullscreen | Behavior | Saving }
{
{ Open image in: | ^Smart Mode^ }
[X] Smooth images when zoomed
[X] Confirm image deletion
[ ] Show hidden images
}
[Close]
}
@endsalt
```



Reiter können auch vertikal angeordnet sein:

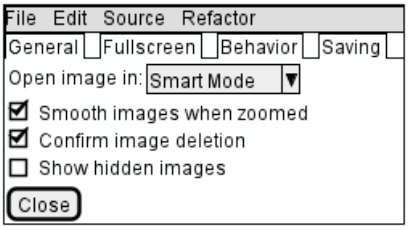
```
@startsalt
{+
{/ <b>General
Fullscreen
Behavior
Saving } |
{
{ Open image in: | ^Smart Mode^ }
[X] Smooth images when zoomed
[X] Confirm image deletion
[ ] Show hidden images
[Close]
}
}
@endsalt
```



14.11 Benutzung von ”menu”

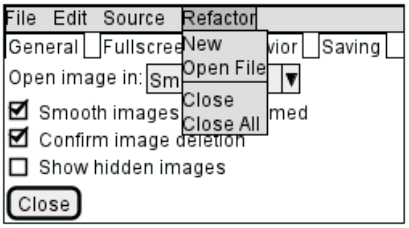
Du kannst ein Menü durch die `{*` Notation hinzufügen.

```
@startsalt
{+
{* File | Edit | Source | Refactor }
{/ General | Fullscreen | Behavior | Saving }
{
{ Open image in: | ^Smart Mode^ }
[X] Smooth images when zoomed
[X] Confirm image deletion
[ ] Show hidden images
}
[Close]
}
@endsalt
```



Es ist auch möglich ein menü zu öffnen:

```
@startsalt
{+
{* File | Edit | Source | Refactor
 Refactor | New | Open File | - | Close | Close All }
{/ General | Fullscreen | Behavior | Saving }
{
{ Open image in: | ^Smart Mode^ }
[X] Smooth images when zoomed
[X] Confirm image deletion
[ ] Show hidden images
}
[Close]
}
@endsalt
```



[Ref. [QA-4184](https://forum.plantuml.net/4184)]

14.12 Erweiterte Tabellen

Du kannst 2 spezielle Notationen für Tabellen benutzen:

- `*` um eine Zelle mit der Linken zu verbinden
- `.` um eine leere Zelle zu definieren

```
@startsalt
{#
. | Column 2 | Column 3
Row header 1 | value 1 | value 2
Row header 2 | A long cell | *
}
@endsalt
```

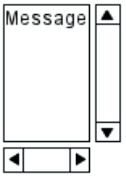
	Column 2	Column 3
Row header 1	value 1	value 2
Row header 2	A long cell	

14.13 Scroll Bars [S, SI, S-]

You can use `{S` notation for scroll bar like in following examples:

- `{S`: for horizontal and vertical scrollbars

```
@startsalt
{S
Message
.
.
.
.
}
@endsalt
```



- {SI : for vertical scrollbar only

```
@startsalt
{SI
Message
.
.
.
.
}
@endsalt
```

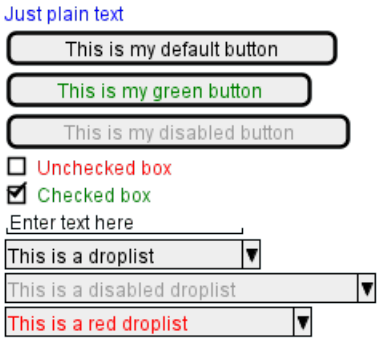
- {S- : for horizontal scrollbar only

```
@startsalt
{S-
Message
.
.
.
.
}
@endsalt
```

14.14 Colors

It is possible to change text color of widget.

```
@startsalt
{
  <color:Blue>Just plain text
  [This is my default button]
  [<color:green>This is my green button]
  [<color:#9a9a9a>This is my disabled button]
  []  <color:red>Unchecked box
  [X] <color:green>Checked box
  "Enter text here   "
  ^This is a droplist^
  ^<color:#9a9a9a>This is a disabled droplist^
  ^<color:red>This is a red droplist^
}
@endsalt
```



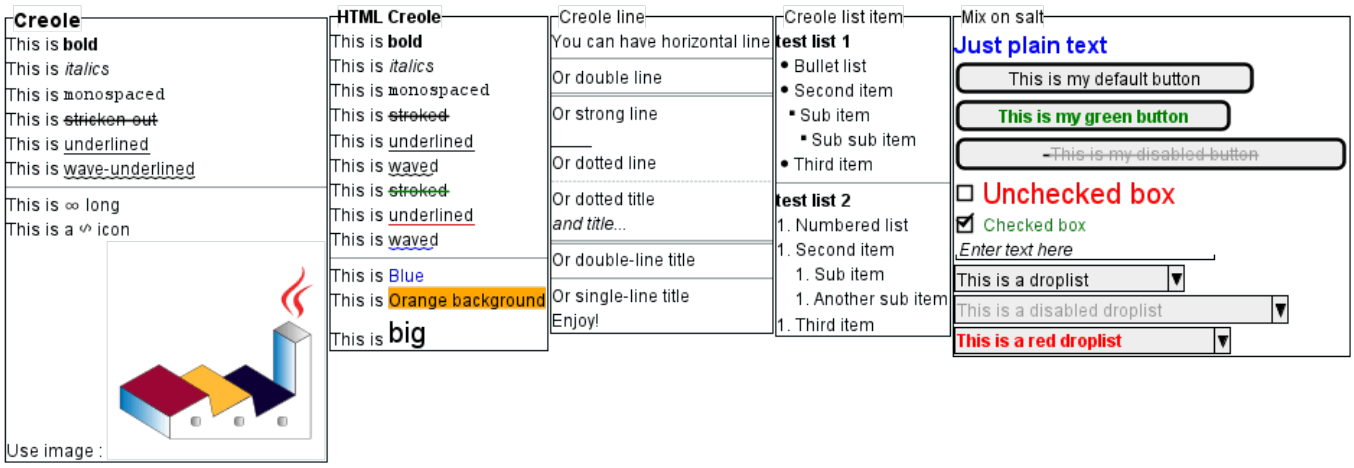
[Ref. QA-12177]

14.15 Creole on Salt

You can use Creole or HTML Creole on salt:

```
@startsalt
{{^==Creole
  This is **bold**
  This is //italics//
  This is ""monospaced""
  This is --stricken-out--
  This is __underlined__
  This is ~~wave-underlined~~
  --test Unicode and icons--
  This is <U+221E> long
  This is a <&code> icon
  Use image : <img:http://plantuml.com/logo3.png>
}|
{^<b>HTML Creole
 This is <b>bold</b>
  This is <i>italics</i>
  This is <font:monospaced>monospaced</font>
  This is <s>stroked</s>
  This is <u>underlined</u>
  This is <w>waved</w>
  This is <s:green>stroked</s>
  This is <u:red>underlined</u>
  This is <w:#0000FF>waved</w>
  -- other examples --
  This is <color:blue>Blue</color>
  This is <back:orange>Orange background</back>
  This is <size:20>big</size>
}|
{^Creole line
You can have horizontal line
----
Or double line
====
Or strong line

----
Or dotted line
..My title..
Or dotted title
//and title... //
==Title==
Or double-line title
```

```
--Another title--
Or single-line title
Enjoy!
}|
{^Creole list item
**test list 1**
* Bullet list
* Second item
** Sub item
*** Sub sub item
* Third item
----
**test list 2**
# Numbered list
# Second item
## Sub item
## Another sub item
# Third item
}|
{^Mix on salt
  ==<color:Blue>Just plain text
  [This is my default button]
  [<b><color:green>This is my green button]
  [ ---<color:#9a9a9a>This is my disabled button-- ]
  []  <size:20><color:red>Unchecked box
  [X] <color:green>Checked box
  "//Enter text here//   "
  ^This is a droplist^
  ^<color:#9a9a9a>This is a disabled droplist^
  ^<b><color:red>This is a red droplist^
}}
@endsalt
```

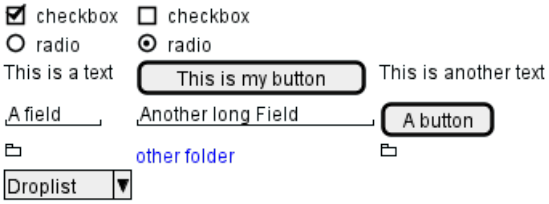


14.16 Pseudo sprite [«, »]

Using << and >> you can define a pseudo-sprite or sprite-like drawing and reusing it latter.

```
@startsalt
 {
 [X] checkbox|[] checkbox
 () radio | (X) radio
 This is a text|[This is my button]|This is another text
 "A field"|"Another long Field"|[A button]
```

```
 <<folder
 .............
 .XXXXX......
 .X...X......
 .XXXXXXXXXX.
 .X........X.
 .X........X.
 .X........X.
 .X........X.
 .XXXXXXXXXX.
 .............
 >>|<color:blue>other folder|<<folder>>
^Droplist^
}
@endsalt
```



[Ref. QA-5849]

14.17 OpenIconic

OpenIconic is an very nice open source icon set. Those icons have been integrated into the creole parser, so you can use them out-of-the-box.

You can use the following syntax: `<&ICON_NAME>`.

```
@startsalt
{
  Login<&person> | "MyName   "
  Password<&key> | "****     "
  [Cancel <&circle-x>] | [OK <&account-login>]
}
@endsalt
```

The complete list is available on OpenIconic Website, or you can use the following special diagram:

```
@startuml
listopeniconic
@enduml
```

List Open Iconic
Credit to
https://useiconic.com/open

account-login
account-logout
action-redo
action-undo
align-center
align-left
align-right
aperture
arrow-bottom
arrow-circle-bottom
arrow-circle-left
arrow-circle-right
arrow-circle-top
arrow-left
arrow-right
arrow-thick-bottom
arrow-thick-left
arrow-thick-right
arrow-thick-top
arrow-top
audio-spectrum
audio
badge
ban
bar-chart
basket
battery-empty
battery-full
beaker
bell
bluetooth
bold
bolt
book
bookmark
box
briefcase
british-pound
browser
brush
bug
bullhorn
calculator
calendar
camera-slr
caret-bottom
caret-left
caret-right
caret-top
cart
chat
check
chevron-bottom
chevron-left
chevron-right
chevron-top
circle-check
circle-x
clipboard
clock
cloud-download
cloud-upload
cloud
cloudy
code
cog
collapse-down
collapse-left
collapse-right
collapse-up
command
comment-square
compass
contrast
copywriting
credit-card
crop
dashboard
data-transfer-download
data-transfer-upload
delete
dial
document
dollar
double-quote-sans-left
double-quote-sans-right
double-quote-serif-left
double-quote-serif-right
droplet
eject
elevator
ellipses
envelope-closed
envelope-open
euro
excerpt
expand-down
expand-left
expand-right
expand-up
external-link
eye
eyedropper
file
fire
flag
flash
folder
fork
fullscreen-enter
fullscreen-exit
globe
graph
grid-four-up
grid-three-up
grid-two-up
hard-drive
header
headphones
heart
home
image
inbox
infinity
info
italic
justify-center
justify-left
justify-right
key
laptop
layers
lightbulb
link-broken
link-intact
list-rich
list
location
lock-locked
lock-unlocked
loop-circular
loop-square
loop
magnifying-glass
map-marker
map
media-pause
media-play
media-record
media-skip-backward
media-skip-forward
media-step-backward
media-step-forward
media-stop
medical-cross
menu
microphone
minus
monitor
moon
move
musical-note
paperclip
pencil
people
person
phone
pie-chart
pin
play-circle
plus
power-standby
print
project
pulse
puzzle-piece
question-mark
rain
random
reload
resize-both
resize-height
resize-width
rss-alt
rss
script
share-boxed
share
shield
signal
signpost
sort-ascending
sort-descending
spreadsheet
star
sun
tablet
tag
tags
target
task
terminal
text
thumb-down
thumb-up
timer
transfer
trash
underline
vertical-align-bottom
vertical-align-center
vertical-align-top
video
volume-high
volume-low
volume-off
warning
wifi
wrench
x
yen
zoom-in
zoom-out

14.18 Add title, header, footer, caption or legend

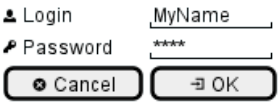
```
@startsalt
title My title
header some header
footer some footer
caption This is caption
legend
The legend
end legend

{+
  Login    | "MyName   "
  Password | "****     "
  [Cancel] | [  OK   ]
}

@endsalt
```

(See also: Common commands)

14.19 Zoom, DPI

14.19.1 Whitout zoom (by default)

```
@startsalt
{
  <&person> Login  | "MyName   "
  <&key> Password  | "****     "
  [<&circle-x> Cancel ] | [ <&account-login> OK   ]
}
@endsalt
```

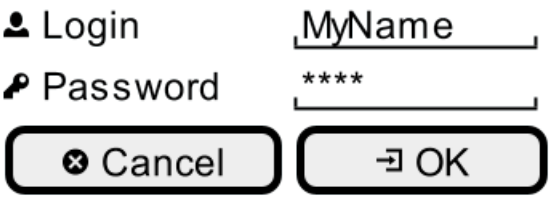


14.19.2 Scale

You can use the `scale` command to zoom the generated image.

You can use either a number or a fraction to define the scale factor. You can also specify either width or height (in pixel). And you can also give both width and height: the image is scaled to fit inside the specified dimension.

```
@startsalt
scale 2
{
  <&person> Login  | "MyName   "
  <&key> Password  | "****     "
  [<&circle-x> Cancel ] | [ <&account-login> OK   ]
}
@endsalt
```

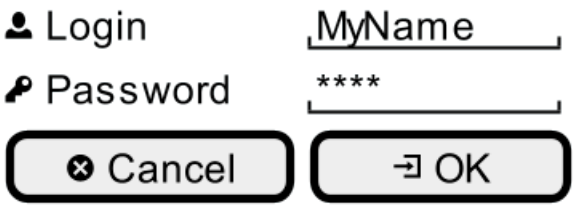


(See also: Zoom on Common commands)

14.19.3 DPI

You can also use the `skinparam dpi`command to zoom the generated image.

```
@startsalt
skinparam dpi 200
{
  <&person> Login  | "MyName   "
  <&key> Password  | "****     "
  [<&circle-x> Cancel ] | [ <&account-login> OK   ]
}
@endsalt
```

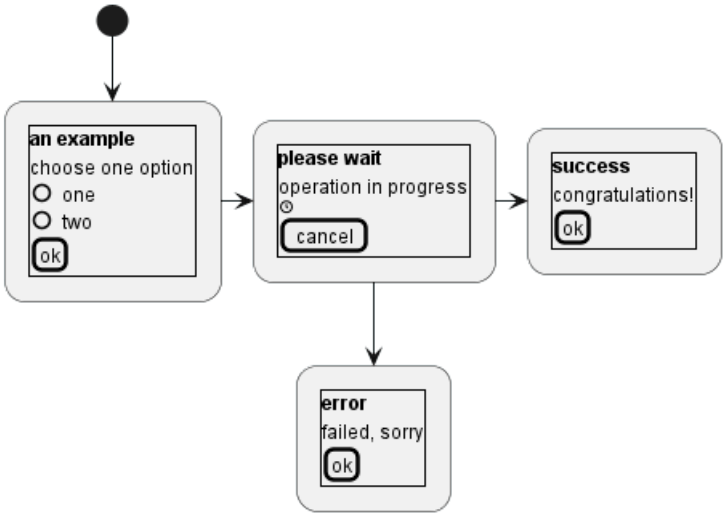


14.20 Include Salt ”on activity diagram”

You can read the following explanation.

```
@startuml
(*) --> "
{{
salt
{+
<b>an example
choose one option
()one
()two
[ok]
}
}}
" as choose

choose -right-> "
{{
salt
{+
<b>please wait
operation in progress
<&clock>
[cancel]
}
}}
" as wait
wait -right-> "
{{
salt
{+
<b>success
congratulations!
[ok]
}
}}
" as success

wait -down-> "
{{
salt
{+
<b>error
failed, sorry
[ok]
}
}}
"
```

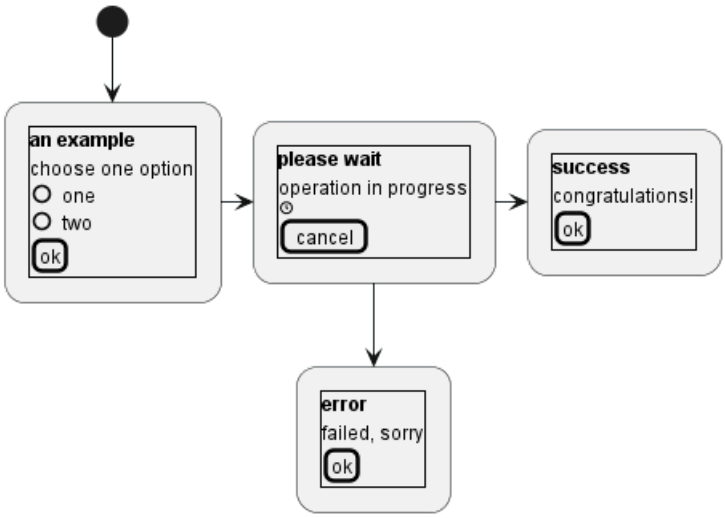
```
@enduml
```



It can also be combined with define macro.

```
@startuml
!unquoted procedure SALT($x)
"{{
salt
%invoke_procedure("_"+$x)
}}" as $x
!endprocedure

!procedure _choose()
{+
<b>an example
choose one option
()one
()two
[ok]
}
!endprocedure

!procedure _wait()
{+
<b>please wait
operation in progress
<&clock>
[cancel]
}
!endprocedure

!procedure _success()
{+
<b>success
congratulations!
[ok]
}
!endprocedure

!procedure _error()
{+
<b>error
```

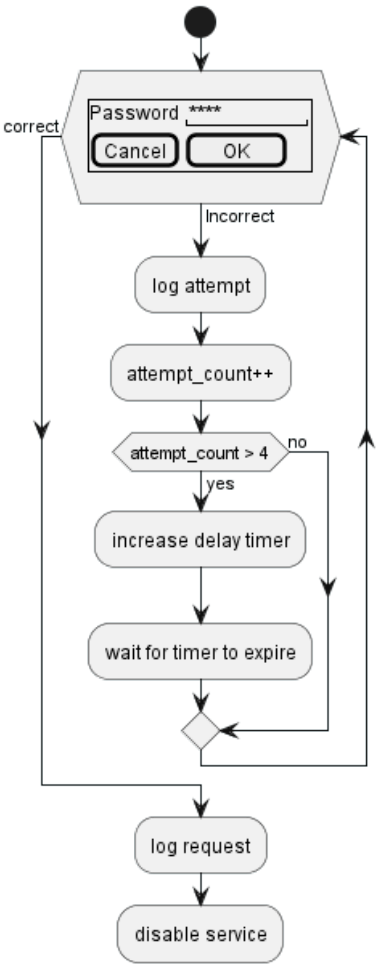
```
failed, sorry
[ok]
}
!endprocedure

(*) --> SALT(choose)
-right-> SALT(wait)
wait -right-> SALT(success)
wait -down-> SALT(error)
@enduml
```



14.21 Include salt ”on while condition of activity diagram”

You can include `salt` on while condition of activity diagram.

```
@startuml
start
while (\n{{\nsalt\n{+\nPassword | "****     "\n[Cancel] | [  OK   ]}\n}}\n) is (Incorrect)
  :log attempt;
  :attempt_count++;
  if (attempt_count > 4) then (yes)
    :increase delay timer;
    :wait for timer to expire;
  else (no)
  endif
endwhile (correct)
:log request;
:disable service;
@enduml
```

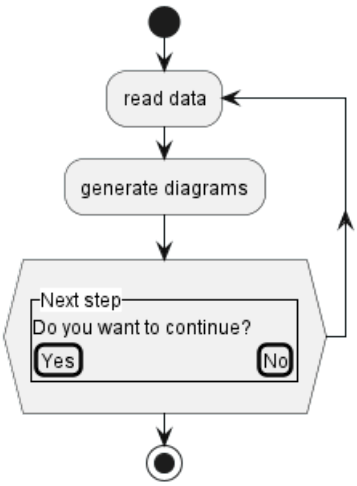


[Ref. QA-8547]

14.22 Include salt "on repeat while condition of activity diagram"

You can include `salt` on 'repeat while' condition of activity diagram.

```
@startuml
start
repeat :read data;
  :generate diagrams;
repeat while (\n{{\nsalt\n{^"Next step"\n  Do you want to continue? \n[Yes]|[No]\n}\n}}\n)
stop
@enduml
```



[Ref. QA-14287]

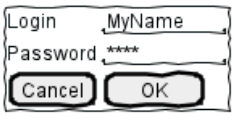
14.23 Skinparam

You can use **[only]** some skinparam command to change the skin of the drawing.

Some example:

```
@startsalt
skinparam Backgroundcolor palegreen
{+
  Login    | "MyName   "
  Password | "****     "
  [Cancel] | [  OK   ]
}
@endsalt
```

```
@startsalt
skinparam handwritten true
{+
  Login    | "MyName   "
  Password | "****     "
  [Cancel] | [  OK   ]
}
@endsalt
```



TODO: FIXME FYI, some other skinparam does not work with salt, as:

```
@startsalt
skinparam defaultFontName monospaced
{+
  Login    | "MyName   "
  Password | "****     "
  [Cancel] | [  OK   ]
}
@endsalt
```

14.24 Style

You can use [**only**] some style command to change the skin of the drawing.

Some example:

```
@startsalt
<style>
saltDiagram {
  BackgroundColor palegreen
}
</style>
{+
  Login    | "MyName   "
  Password | "****     "
  [Cancel] | [  OK   ]
}
@endsalt
```

TODO: FIXME FYI, some other style does not work with salt, as:

```
@startsalt
<style>
saltDiagram {
  Fontname Monospaced
  FontSize 10
  FontStyle italic
  LineThickness 0.5
  LineColor red
}
</style>
{+
  Login    | "MyName   "
  Password | "****     "
  [Cancel] | [  OK   ]
}
@endsalt
```

[Ref. QA-13460]

15 Archimate Diagram

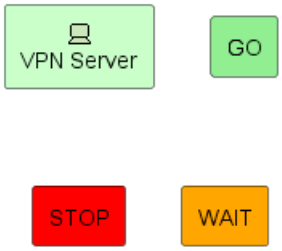
This is only a proposal and subject to change.

You are very welcome to create a new discussion on this future syntax. Your feedbacks, ideas and suggestions help us to find the right solution.

15.1 Archimate keyword

You can use the `archimate` keyword to define an element. Stereotype can optionally specify an additional icon. Some colors (`Business`, `Application`, `Motivation`, `Strategy`, `Technology`, `Physical`, `Implementation`) are also available.

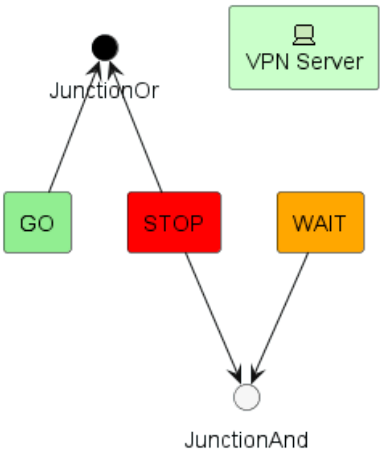
```
@startuml
archimate #Technology "VPN Server" as vpnServerA <<technology-device>>

rectangle GO #lightgreen
rectangle STOP #red
rectangle WAIT #orange
@enduml
```



15.2 Defining Junctions

Using the `circle` keyword and the preprocessor, you can also create junctions.

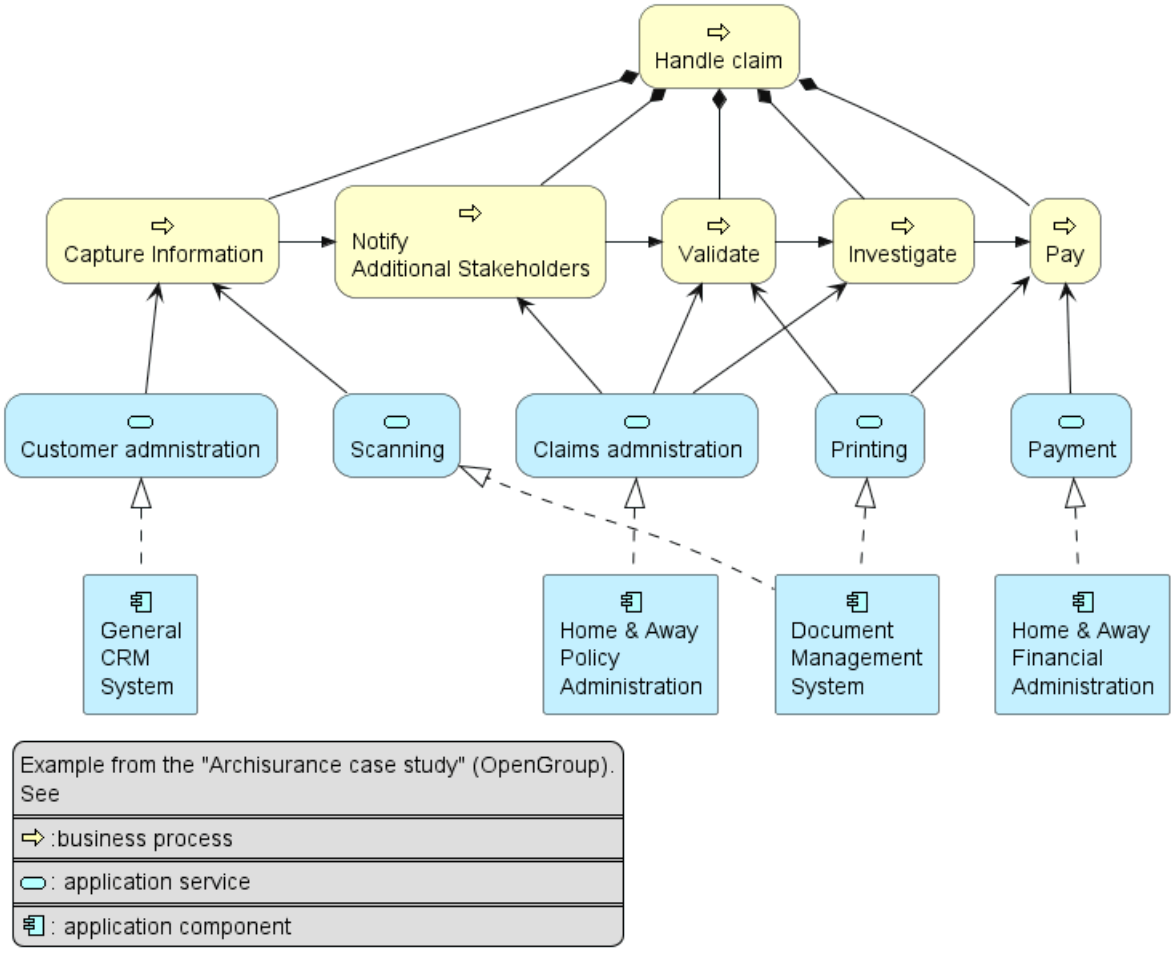
```
@startuml
!define Junction_Or circle #black
!define Junction_And circle #whitesmoke

Junction_And JunctionAnd
Junction_Or JunctionOr

archimate #Technology "VPN Server" as vpnServerA <<technology-device>>

rectangle GO #lightgreen
rectangle STOP #red
rectangle WAIT #orange
GO -up-> JunctionOr
STOP -up-> JunctionOr
STOP -down-> JunctionAnd
WAIT -down-> JunctionAnd
@enduml
```



15.3 Example 1

```
@startuml
skinparam rectangle<<behavior>> {
roundCorner 25
}
sprite $bProcess jar:archimate/business-process
sprite $aService jar:archimate/application-service
sprite $aComponent jar:archimate/application-component

rectangle "Handle claim"  as HC <<$bProcess>><<behavior>> #Business
rectangle "Capture Information"  as CI <<$bProcess>><<behavior>> #Business
rectangle "Notify\nAdditional Stakeholders" as NAS <<$bProcess>><<behavior>> #Business
rectangle "Validate" as V <<$bProcess>><<behavior>> #Business
rectangle "Investigate" as I <<$bProcess>><<behavior>> #Business
rectangle "Pay" as P <<$bProcess>><<behavior>> #Business

HC *-down- CI
HC *-down- NAS
HC *-down- V
HC *-down- I
HC *-down- P

CI -right->> NAS
NAS -right->> V
V -right->> I
I -right->> P

rectangle "Scanning" as scanning <<$aService>><<behavior>> #Application
rectangle "Customer admnistration" as customerAdministration <<$aService>><<behavior>> #Application
rectangle "Claims admnistration" as claimsAdministration <<$aService>><<behavior>> #Application
rectangle Printing <<$aService>><<behavior>> #Application
rectangle Payment <<$aService>><<behavior>> #Application

scanning -up-> CI
customerAdministration  -up-> CI
claimsAdministration -up-> NAS
claimsAdministration -up-> V
claimsAdministration -up-> I
Payment -up-> P

Printing -up-> V
Printing -up-> P
```

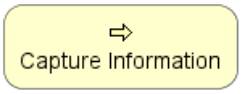
```
rectangle "Document\nManagement\nSystem" as DMS <<$aComponent>> #Application
rectangle "General\nCRM\nSystem" as CRM <<$aComponent>>  #Application
rectangle "Home & Away\nPolicy\nAdministration" as HAPA <<$aComponent>> #Application
rectangle "Home & Away\nFinancial\nAdministration" as HFPA <<$aComponent>>  #Application

DMS .up.|> scanning
DMS .up.|> Printing
CRM .up.|> customerAdministration
HAPA .up.|> claimsAdministration
HFPA .up.|> Payment

legend left
Example from the "Archisurance case study" (OpenGroup).
See
====
<$bProcess> :business process
====
<$aService> : application service
====
<$aComponent> : application component
endlegend
@enduml
```



15.4 Example 2

```
@startuml
```

```
skinparam roundcorner 25
rectangle "Capture Information"  as CI <<$archimate/business-process>> #Business
@enduml
```



15.5 List possible sprites

You can list all possible sprites for Archimate using the following diagram:

```
@startuml
listsprite
@enduml
```

15.6 ArchiMate Macros

15.6.1 Archimate Macros and Library

A list of Archimate macros are defined Archimate-PlantUML here which simplifies the creation of ArchiMate diagrams, and Archimate is natively on the Standard Library of PlantUML.

15.6.2 Archimate elements

Using the macros, creation of ArchiMate elements are done using the following format: `Category_ElementName(nameOfThe "description")`

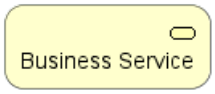
For example:

- To define a *Stakeholder* element, which is part of Motivation category, the syntax will be `Motivation_Stakeholder(S "Stakeholder Description")`:

```
@startuml
!include <archimate/Archimate>
Motivation_Stakeholder(StakeholderElement, "Stakeholder Description")
@enduml
```

- To define a *Business Service* element, `Business_Service(BService, "Business Service")`:

```
@startuml
!include <archimate/Archimate>
Business_Service(BService, "Business Service")
@enduml
```



15.6.3 Archimate relationships

The ArchiMate relationships are defined with the following pattern: `Rel_RelationType(fromElement, toElement, "description")` and to define the direction/orientation of the two elements: `Rel_RelationType_Direction toElement, "description")`

The `RelationTypes` supported are:

- Access
- Aggregation
- Assignment
- Association
- Composition
- Flow
- Influence
- Realization
- Serving
- Specialization
- Triggering

The `Directions` supported are:

- Up
- Down
- Left
- Right

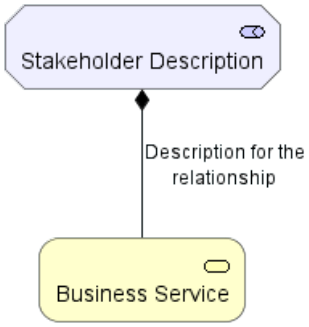
For example:

- To denote a composition relationship between the *Stakeholder* and *Business Service* defined above, the syntax will be

```
Rel_Composition(StakeholderElement, BService, "Description for the relationship")
```

```
@startuml
!include <archimate/Archimate>
Motivation_Stakeholder(StakeholderElement, "Stakeholder Description")
```

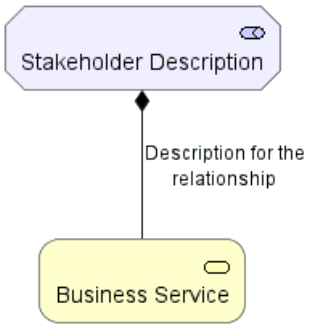
```
Business_Service(BService, "Business Service")
Rel_Composition(StakeholderElement, BService, "Description for the relationship")
@enduml
```



- Unordered List ItemTo orient the two elements in top - down position, the syntax will be

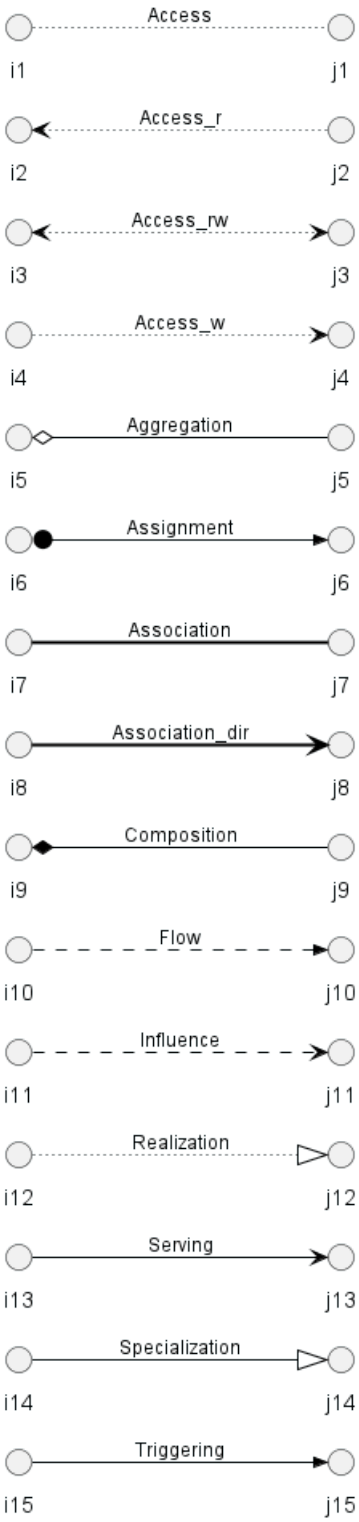
```
Rel_Composition_Down(StakeholderElement, BService, "Description for the relationship")
```

```
@startuml
!include <archimate/Archimate>
Motivation_Stakeholder(StakeholderElement, "Stakeholder Description")
Business_Service(BService, "Business Service")
Rel_Composition_Down(StakeholderElement, BService, "Description for the relationship")
@enduml
```



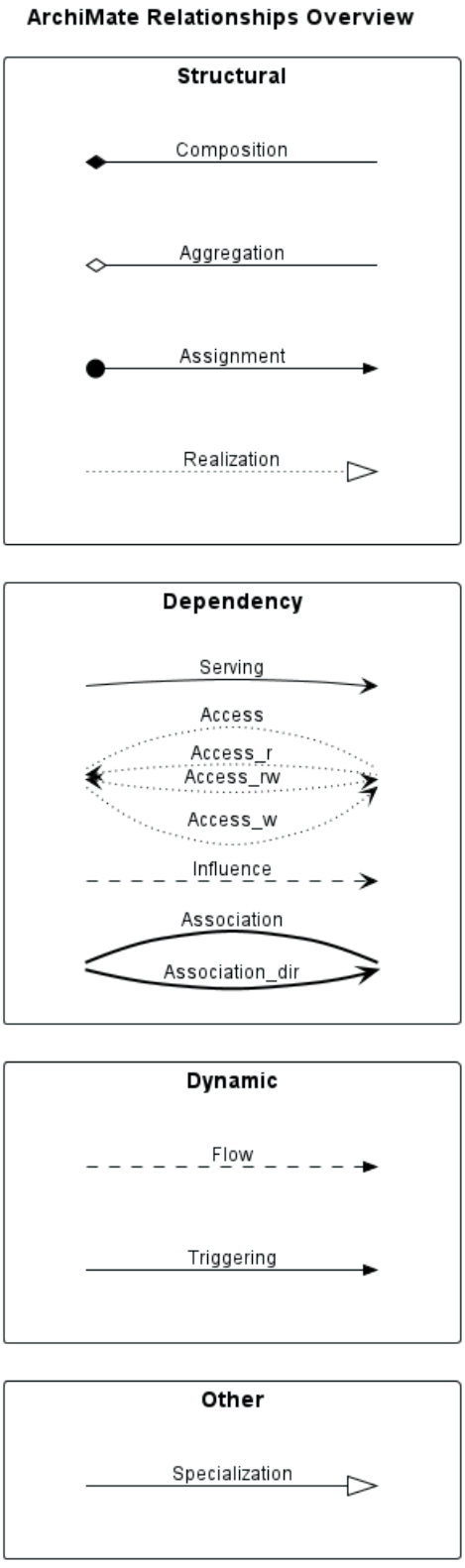
15.6.4 Appendice: Examples of all Archimate RelationTypes

```
@startuml
left to right direction
skinparam nodesep 4
!include <archimate/Archimate>
Rel_Triggering(i15, j15, Triggering)
Rel_Specialization(i14, j14, Specialization)
Rel_Serving(i13, j13, Serving)
Rel_Realization(i12, j12, Realization)
Rel_Influence(i11, j11, Influence)
Rel_Flow(i10, j10, Flow)
Rel_Composition(i9, j9, Composition)
Rel_Association_dir(i8, j8, Association_dir)
Rel_Association(i7, j7, Association)
Rel_Assignment(i6, j6, Assignment)
Rel_Aggregation(i5, j5, Aggregation)
Rel_Access_w(i4, j4, Access_w)
Rel_Access_rw(i3, j3, Access_rw)
Rel_Access_r(i2, j2, Access_r)
Rel_Access(i1, j1, Access)
@enduml
```




```
@startuml
title ArchiMate Relationships Overview
skinparam nodesep 5
<style>
interface {
    shadowing 0
    backgroundcolor transparent
    linecolor transparent
    FontColor transparent
```

```
}
</style>
!include <archimate/Archimate>
left to right direction

rectangle Other {
() i14
() j14
}


rectangle Dynamic {
() i10
() j10
() i15
() j15
}

rectangle Dependency {
() i13
() j13
() i4
() j4
() i11
() j11
() i7
() j7
}

rectangle Structural {
() i9
() j9
() i5
() j5
() i6
() j6
() i12
() j12
}

Rel_Triggering(i15, j15, Triggering)
Rel_Specialization(i14, j14, Specialization)
Rel_Serving(i13, j13, Serving)
Rel_Realization(i12, j12, Realization)
Rel_Influence(i11, j11, Influence)
Rel_Flow(i10, j10, Flow)
Rel_Composition(i9, j9, Composition)
Rel_Association_dir(i7, j7, \nAssociation_dir)
Rel_Association(i7, j7, Association)
Rel_Assignment(i6, j6, Assignment)
Rel_Aggregation(i5, j5, Aggregation)
Rel_Access_w(i4, j4, Access_w)
Rel_Access_rw(i4, j4, Access_rw)
Rel_Access_r(i4, j4, Access_r)
Rel_Access(i4, j4, Access)
@enduml
```



[Adapted from Archimate PR#25]

16 Gantt Diagram

The Gantt is described in *natural* language, using very simple sentences (subject-verb-complement).

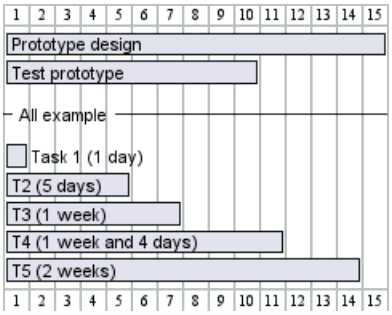
16.1 Declaring tasks

Tasks defined using square bracket.

16.1.1 Duration

Their durations are defined using the `last` verb:

```
@startgantt
[Prototype design] lasts 15 days
[Test prototype] lasts 10 days
-- All example --
[Task 1 (1 day)] lasts 1 day
[T2 (5 days)] lasts 5 days
[T3 (1 week)] lasts 1 week
[T4 (1 week and 4 days)] lasts 1 week and 4 days
[T5 (2 weeks)] lasts 2 weeks
@endgantt
```



A week is a synonym for how many non-closed days are in a week. So if you specify Saturday and Sunday as closed, a week will be equivalent to 5 days

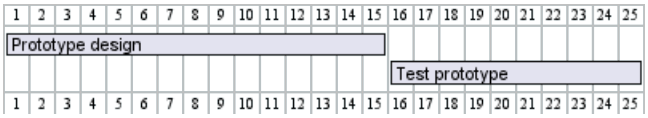
16.1.2 Start

Their beginning are defined using the `start` verb:

```
@startgantt
[Prototype design] lasts 15 days
[Test prototype] lasts 10 days

Project starts 2020-07-01
[Prototype design] starts 2020-07-01
[Test prototype] starts 2020-07-16
@endgantt
```

```
@startgantt
[Prototype design] lasts 15 days
[Test prototype] lasts 10 days

[Prototype design] starts D+0
```

```
[Test prototype] starts D+15
@endgantt
```



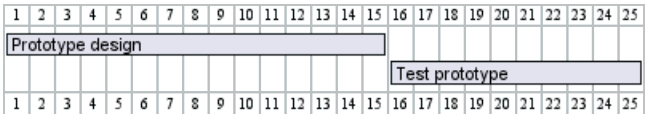
[Ref. for `D+nn` form: QA-14494]

16.1.3 End

Their ending are defined using the `end` verb:

```
@startgantt
[Prototype design] lasts 15 days
[Test prototype] lasts 10 days

Project starts 2020-07-01
[Prototype design] ends 2020-07-15
[Test prototype] ends 2020-07-25
@endgantt
```

```
@startgantt
[Prototype design] lasts 15 days
[Test prototype] lasts 10 days

[Prototype design] ends D+14
[Test prototype] ends D+24
@endgantt
```



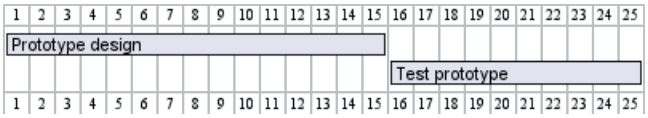
16.1.4 Start/End

It is possible to define both absolutely, by specifying dates:

```
@startgantt
Project starts 2020-07-01
[Prototype design] starts 2020-07-01
[Test prototype] starts 2020-07-16
[Prototype design] ends 2020-07-15
[Test prototype] ends 2020-07-25

@endgantt
```

```
@startgantt
```

```
[Prototype design] starts D+0
[Test prototype] starts D+15
[Prototype design] ends D+14
[Test prototype] ends D+24
@endgantt
```



16.2 One-line declaration (with the and conjunction)

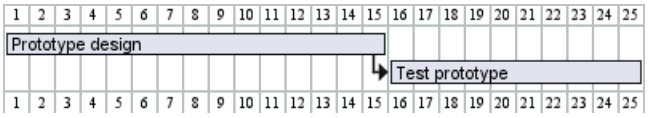
It is possible to combine declaration on one line with the `and` conjunction.

```
@startgantt
Project starts 2020-07-01
[Prototype design] starts 2020-07-01 and ends 2020-07-15
[Test prototype] starts 2020-07-16 and lasts 10 days
@endgantt
```

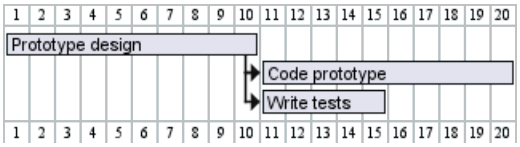
16.3 Adding constraints

It is possible to add constraints between tasks.

```
@startgantt
[Prototype design] lasts 15 days
[Test prototype] lasts 10 days
[Test prototype] starts at [Prototype design]'s end
@endgantt
```




```
@startgantt
[Prototype design] lasts 10 days
[Code prototype] lasts 10 days
[Write tests] lasts 5 days
[Code prototype] starts at [Prototype design]'s end
[Write tests] starts at [Code prototype]'s start
@endgantt
```

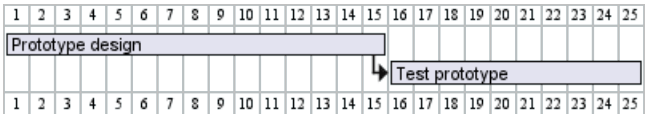


16.4 Short names

It is possible to define short name for tasks with the `as` keyword.

```
@startgantt
[Prototype design] as [D] lasts 15 days
[Test prototype] as [T] lasts 10 days
```

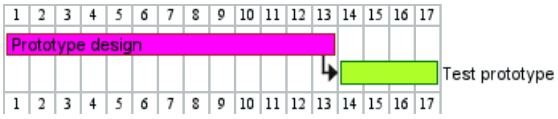
```
[T] starts at [D]'s end
@endgantt
```



16.5 Customize colors

It is also possible to customize colors with `is colored in`.

```
@startgantt
[Prototype design] lasts 13 days
[Test prototype] lasts 4 days
[Test prototype] starts at [Prototype design]'s end
[Prototype design] is colored in Fuchsia/FireBrick
[Test prototype] is colored in GreenYellow/Green
@endgantt
```



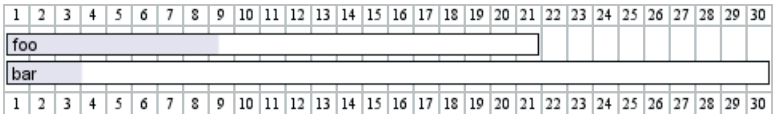
16.6 Completion status

16.6.1 Adding completion depending percentage

You can set the completion status of a task, by the command:

- `is xx% completed`
- `is xx% complete`

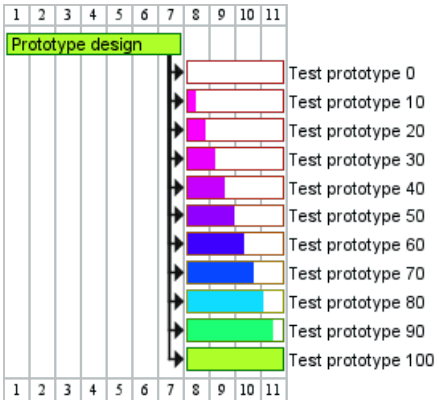
```
@startgantt
[foo] lasts 21 days
[foo] is 40% completed
[bar] lasts 30 days and is 10% complete
@endgantt
```



16.6.2 Change colour of completion (by style)

```
@startgantt

<style>
ganttDiagram {
  task {
    BackGroundColor GreenYellow
    LineColor Green
    unstarted {
      BackGroundColor Fuchsia
      LineColor FireBrick
    }
  }
}
</style>

[Prototype design] lasts 7 days
```

```
[Test prototype 0] lasts 4 days
[Test prototype 10] lasts 4 days
[Test prototype 20] lasts 4 days
[Test prototype 30] lasts 4 days
[Test prototype 40] lasts 4 days
[Test prototype 50] lasts 4 days
[Test prototype 60] lasts 4 days
[Test prototype 70] lasts 4 days
[Test prototype 80] lasts 4 days
[Test prototype 90] lasts 4 days
[Test prototype 100] lasts 4 days

[Test prototype 0] starts at [Prototype design]'s end
[Test prototype 10] starts at [Prototype design]'s end
[Test prototype 20] starts at [Prototype design]'s end
[Test prototype 30] starts at [Prototype design]'s end
[Test prototype 40] starts at [Prototype design]'s end
[Test prototype 50] starts at [Prototype design]'s end
[Test prototype 60] starts at [Prototype design]'s end
[Test prototype 70] starts at [Prototype design]'s end
[Test prototype 80] starts at [Prototype design]'s end
[Test prototype 90] starts at [Prototype design]'s end
[Test prototype 100] starts at [Prototype design]'s end

[Test prototype 0] is 0% complete
[Test prototype 10] is 10% complete
[Test prototype 20] is 20% complete
[Test prototype 30] is 30% complete
[Test prototype 40] is 40% complete
[Test prototype 50] is 50% complete
[Test prototype 60] is 60% complete
[Test prototype 70] is 70% complete
[Test prototype 80] is 80% complete
[Test prototype 90] is 90% complete
[Test prototype 100] is 100% complete

@endgantt
```



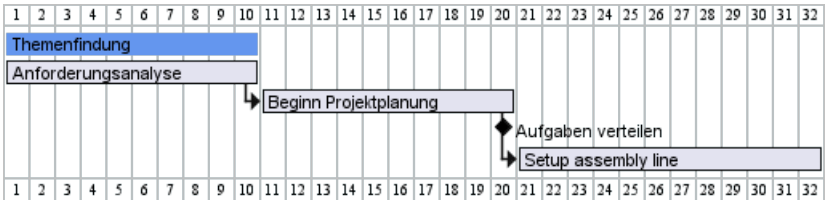
[Ref. QA-8297]

16.7 Milestone

You can define Milestones using the `happens` verb.

```
@startgantt
[Themenfindung] lasts 10 days
```

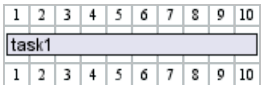
```
[Themenfindung] is colored in CornflowerBlue
[Anforderungsanalyse] lasts 10 days
[Beginn Projektplanung] lasts 10 days
[Beginn Projektplanung] starts at [Anforderungsanalyse]'s end
[Aufgaben verteilen] happens at [Beginn Projektplanung]'s end
[Setup assembly line] lasts 12 days
[Setup assembly line] starts at [Beginn Projektplanung]'s end
@endgantt
```



16.8 Hyperlinks

You can add hyperlinks to tasks.

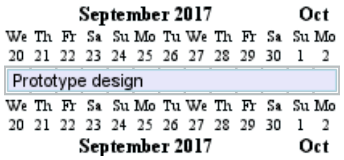
```
@startgantt
[task1] lasts 10 days
[task1] links to [[http://plantuml.com]]
@endgantt
```



16.9 Calendar

You can specify a starting date for the whole project. By default, the first task starts at this date.

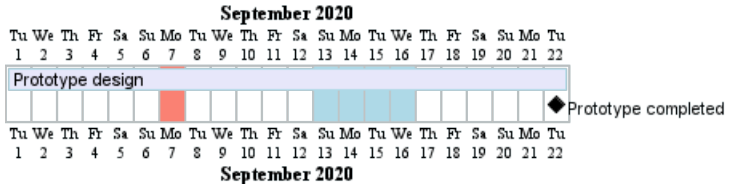
```
@startgantt
Project starts the 20th of september 2017
[Prototype design] as [TASK1] lasts 13 days
[TASK1] is colored in Lavender/LightBlue
@endgantt
```



16.10 Coloring days

It is possible to add colors to some days.

```
@startgantt
Project starts the 2020/09/01

2020/09/07 is colored in salmon
2020/09/13 to 2020/09/16 are colored in lightblue

[Prototype design] as [TASK1] lasts 22 days
[TASK1] is colored in Lavender/LightBlue
[Prototype completed] happens at [TASK1]'s end
@endgantt
```



16.11 Changing scale

You can change scale for very long project, with one of those parameters:

- printscale
- ganttscale
- projectscale

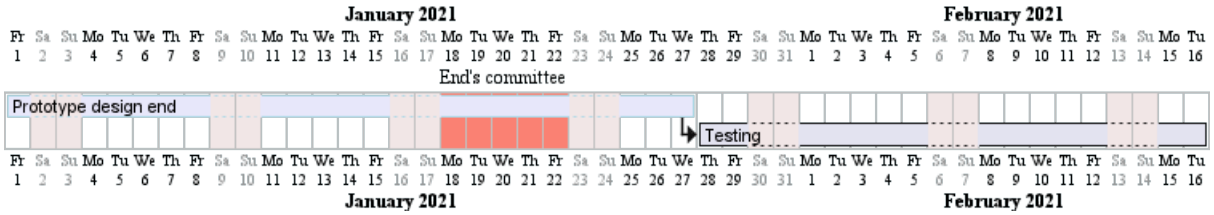
and one of the values:

- daily *(by default)*
- weekly
- monthly
- quarterly
- yearly

(See QA-11272, QA-9041 and QA-10948)

16.11.1 Daily *(by default)*

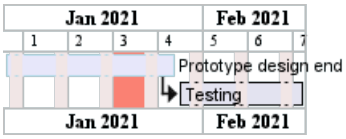
```
@startgantt
saturday are closed
sunday are closed

Project starts the 1st of january 2021
[Prototype design end] as [TASK1] lasts 19 days
[TASK1] is colored in Lavender/LightBlue
[Testing] lasts 14 days
[TASK1]->[Testing]

2021-01-18 to 2021-01-22 are named [End's committee]
2021-01-18 to 2021-01-22 are colored in salmon
@endgantt
```



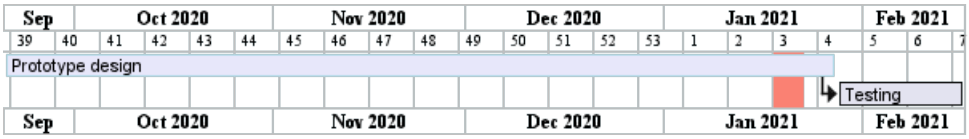
16.11.2 Weekly

```
@startgantt
printscale weekly
saturday are closed
sunday are closed

Project starts the 1st of january 2021
[Prototype design end] as [TASK1] lasts 19 days
[TASK1] is colored in Lavender/LightBlue
```

```
[Testing] lasts 14 days
[TASK1]->[Testing]

2021-01-18 to 2021-01-22 are named [End's committee]
2021-01-18 to 2021-01-22 are colored in salmon
@endgantt
```

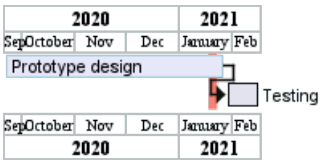



```
@startgantt
printscale weekly
Project starts the 20th of september 2020
[Prototype design] as [TASK1] lasts 130 days
[TASK1] is colored in Lavender/LightBlue
[Testing] lasts 20 days
[TASK1]->[Testing]

2021-01-18 to 2021-01-22 are named [End's committee]
2021-01-18 to 2021-01-22 are colored in salmon
@endgantt
```



16.11.3 Monthly

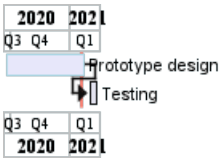
```
@startgantt
projectscale monthly
Project starts the 20th of september 2020
[Prototype design] as [TASK1] lasts 130 days
[TASK1] is colored in Lavender/LightBlue
[Testing] lasts 20 days
[TASK1]->[Testing]

2021-01-18 to 2021-01-22 are named [End's committee]
2021-01-18 to 2021-01-22 are colored in salmon
@endgantt
```



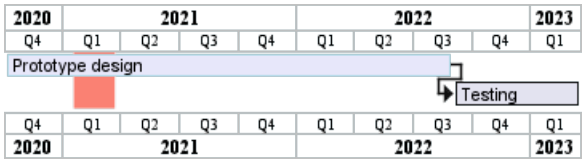
16.11.4 Quarterly

```
@startgantt
projectscale quarterly
Project starts the 20th of september 2020
[Prototype design] as [TASK1] lasts 130 days
[TASK1] is colored in Lavender/LightBlue
[Testing] lasts 20 days
[TASK1]->[Testing]

2021-01-18 to 2021-01-22 are named [End's committee]
```

```
2021-01-18 to 2021-01-22 are colored in salmon
@endgantt
```

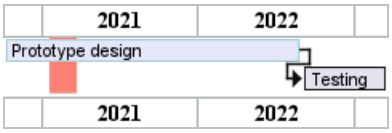



```
@startgantt
projectscale quarterly
Project starts the 1st of october 2020
[Prototype design] as [TASK1] lasts 700 days
[TASK1] is colored in Lavender/LightBlue
[Testing] lasts 200 days
[TASK1]->[Testing]

2021-01-18 to 2021-03-22 are colored in salmon
@endgantt
```



16.11.5 Yearly

```
@startgantt
projectscale yearly
Project starts the 1st of october 2020
[Prototype design] as [TASK1] lasts 700 days
[TASK1] is colored in Lavender/LightBlue
[Testing] lasts 200 days
[TASK1]->[Testing]

2021-01-18 to 2021-03-22 are colored in salmon
@endgantt
```



16.12 Zoom (example for all scale)

You can change zoom, with the parameter:

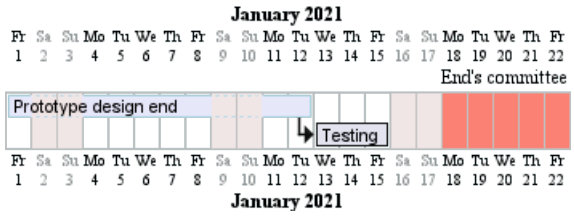
- `zoom <integer>`

16.12.1 Zoom on weekly scale

16.12.2 Without zoom

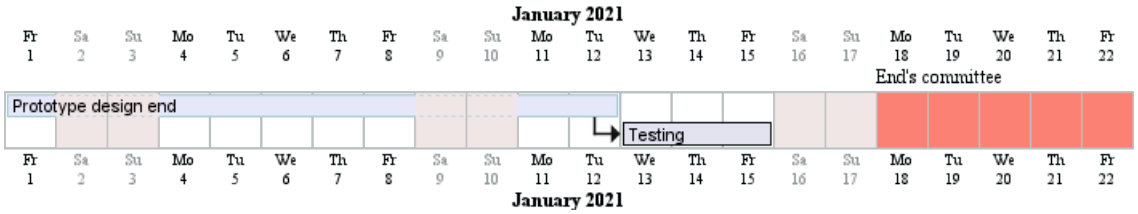
```
@startgantt
printscale daily
saturday are closed
sunday are closed

Project starts the 1st of january 2021
[Prototype design end] as [TASK1] lasts 8 days
[TASK1] is colored in Lavender/LightBlue
```

```
[Testing] lasts 3 days
[TASK1]->[Testing]

2021-01-18 to 2021-01-22 are named [End's committee]
2021-01-18 to 2021-01-22 are colored in salmon
@endgantt
```



16.12.3 With zoom

```
@startgantt
printscale daily zoom 2
saturday are closed
sunday are closed

Project starts the 1st of january 2021
[Prototype design end] as [TASK1] lasts 8 days
[TASK1] is colored in Lavender/LightBlue
[Testing] lasts 3 days
[TASK1]->[Testing]

2021-01-18 to 2021-01-22 are named [End's committee]
2021-01-18 to 2021-01-22 are colored in salmon
@endgantt
```

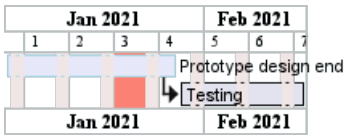


[Ref. QA-13725]

16.12.4 Zoom on weekly scale

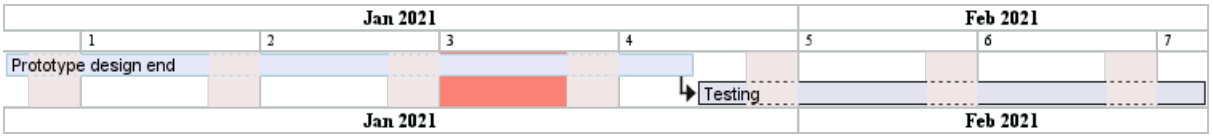
16.12.5 Without zoom

```
@startgantt
printscale weekly
saturday are closed
sunday are closed

Project starts the 1st of january 2021
[Prototype design end] as [TASK1] lasts 19 days
[TASK1] is colored in Lavender/LightBlue
[Testing] lasts 14 days
[TASK1]->[Testing]

2021-01-18 to 2021-01-22 are named [End's committee]
2021-01-18 to 2021-01-22 are colored in salmon
@endgantt
```



16.12.6 With zoom

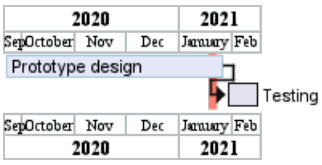
```
@startgantt
printscale weekly zoom 4
saturday are closed
sunday are closed

Project starts the 1st of january 2021
[Prototype design end] as [TASK1] lasts 19 days
[TASK1] is colored in Lavender/LightBlue
[Testing] lasts 14 days
[TASK1]->[Testing]

2021-01-18 to 2021-01-22 are named [End's committee]
2021-01-18 to 2021-01-22 are colored in salmon
@endgantt
```



16.12.7 Zoom on monthly scale

16.12.8 Without zoom

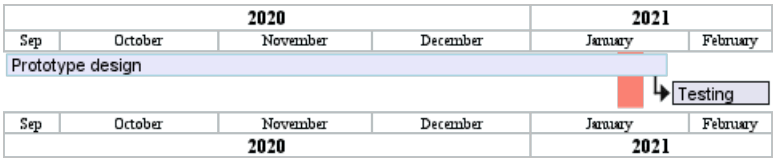
```
@startgantt
projectscale monthly
Project starts the 20th of september 2020
[Prototype design] as [TASK1] lasts 130 days
[TASK1] is colored in Lavender/LightBlue
[Testing] lasts 20 days
[TASK1]->[Testing]

2021-01-18 to 2021-01-22 are named [End's committee]
2021-01-18 to 2021-01-22 are colored in salmon
@endgantt
```



16.12.9 With zoom

```
@startgantt
projectscale monthly zoom 3
Project starts the 20th of september 2020
[Prototype design] as [TASK1] lasts 130 days
[TASK1] is colored in Lavender/LightBlue
[Testing] lasts 20 days
[TASK1]->[Testing]

2021-01-18 to 2021-01-22 are named [End's committee]
```

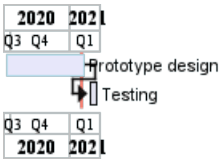
```
2021-01-18 to 2021-01-22 are colored in salmon
@endgantt
```



16.12.10 Zoom on quarterly scale

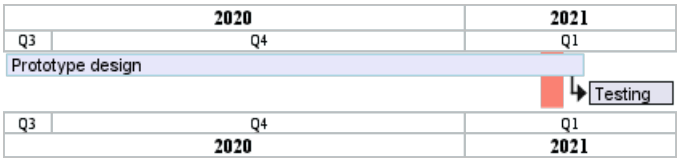
16.12.11 Without zoom

```
@startgantt
projectscale quarterly
Project starts the 20th of september 2020
[Prototype design] as [TASK1] lasts 130 days
[TASK1] is colored in Lavender/LightBlue
[Testing] lasts 20 days
[TASK1]->[Testing]

2021-01-18 to 2021-01-22 are named [End's committee]
2021-01-18 to 2021-01-22 are colored in salmon
@endgantt
```



16.12.12 With zoom

```
@startgantt
projectscale quarterly zoom 7
Project starts the 20th of september 2020
[Prototype design] as [TASK1] lasts 130 days
[TASK1] is colored in Lavender/LightBlue
[Testing] lasts 20 days
[TASK1]->[Testing]

2021-01-18 to 2021-01-22 are named [End's committee]
2021-01-18 to 2021-01-22 are colored in salmon
@endgantt
```

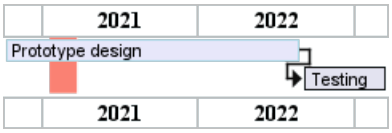


16.12.13 Zoom on yearly scale

16.12.14 Without zoom

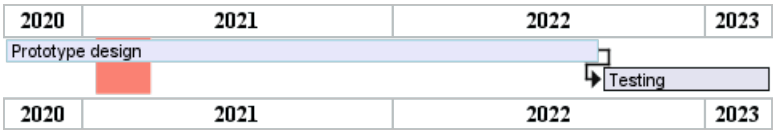
```
@startgantt
projectscale yearly
Project starts the 1st of october 2020
[Prototype design] as [TASK1] lasts 700 days
[TASK1] is colored in Lavender/LightBlue
[Testing] lasts 200 days
```

```
[TASK1]->[Testing]

2021-01-18 to 2021-03-22 are colored in salmon
@endgantt
```



16.12.15 With zoom

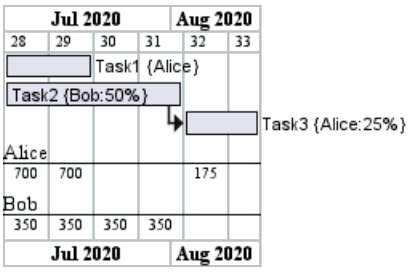
```
@startgantt
projectscale yearly zoom 2
Project starts the 1st of october 2020
[Prototype design] as [TASK1] lasts 700 days
[TASK1] is colored in Lavender/LightBlue
[Testing] lasts 200 days
[TASK1]->[Testing]

2021-01-18 to 2021-03-22 are colored in salmon
@endgantt
```



16.13 Weekscale with Weeknumbers or Calendar Date

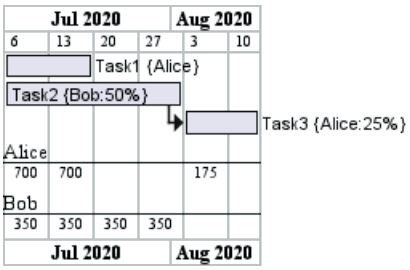
16.13.1 With Weeknumbers *(by default)*

```
@startgantt
printscale weekly
Project starts the 6th of July 2020
[Task1] on {Alice} lasts 2 weeks
[Task2] on {Bob:50%} lasts 2 weeks
then [Task3] on {Alice:25%} lasts 3 days
@endgantt
```



16.13.2 With Calendar Date

```
@startgantt
printscale weekly with calendar date
Project starts the 6th of July 2020
[Task1] on {Alice} lasts 2 weeks
[Task2] on {Bob:50%} lasts 2 weeks
then [Task3] on {Alice:25%} lasts 3 days
@endgantt
```

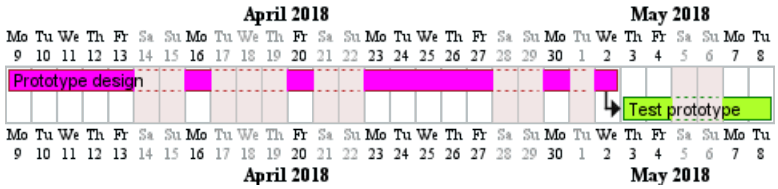


[Ref. QA-11630]

16.14 Close day

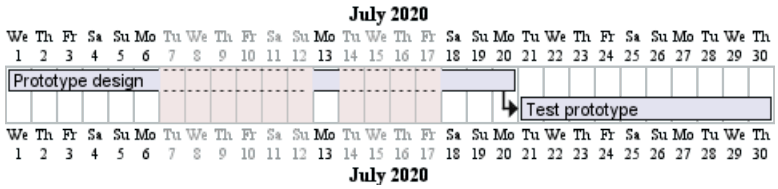
It is possible to close some day.

```
@startgantt
project starts the 2018/04/09
saturday are closed
sunday are closed
2018/05/01 is closed
2018/04/17 to 2018/04/19 is closed
[Prototype design] lasts 14 days
[Test prototype] lasts 4 days
[Test prototype] starts at [Prototype design]'s end
[Prototype design] is colored in Fuchsia/FireBrick
[Test prototype] is colored in GreenYellow/Green
@endgantt
```



Then it is possible to open some closed day.

```
@startgantt
2020-07-07 to 2020-07-17 is closed
2020-07-13 is open

Project starts the 2020-07-01
[Prototype design] lasts 10 days
Then [Test prototype] lasts 10 days
@endgantt
```

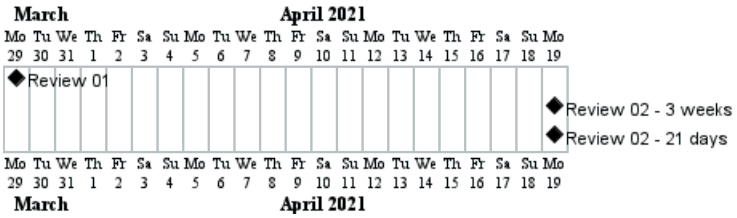


16.15 Definition of a week depending of closed days

A **week** is a synonym for how many non-closed days are in a week, as:

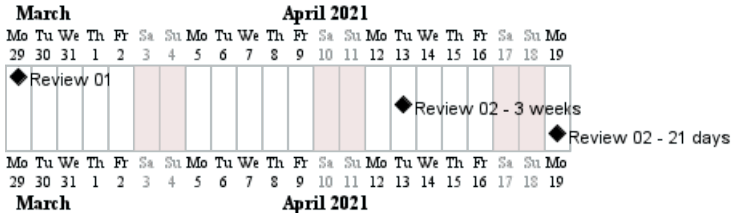
```
@startgantt
Project starts 2021-03-29
[Review 01] happens at 2021-03-29
[Review 02 - 3 weeks] happens on 3 weeks after [Review 01]'s end
[Review 02 - 21 days] happens on 21 days after [Review 01]'s end
```

```
@endgantt
```



So if you specify *Saturday* and *Sunday* as closed, a **week** will be equivalent to 5 days, as:

```
@startgantt
Project starts 2021-03-29
saturday are closed
sunday are closed
[Review 01] happens at 2021-03-29
[Review 02 - 3 weeks] happens on 3 weeks after [Review 01]'s end
[Review 02 - 21 days] happens on 21 days after [Review 01]'s end
@endgantt
```

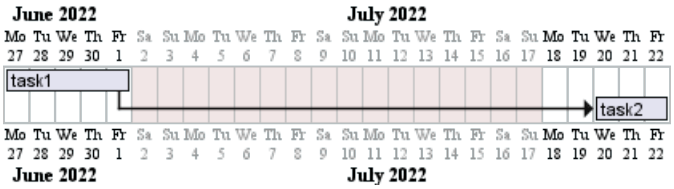


[Ref. QA-13434]

16.16 Working days

It is possible to manage working days.

```
@startgantt

saturday are closed
sunday are closed
2022-07-04 to 2022-07-15 is closed

Project starts 2022-06-27
[task1] starts at 2022-06-27 and lasts 1 week
[task2] starts 2 working days after [task1]'s end and lasts 3 days

@endgantt
```



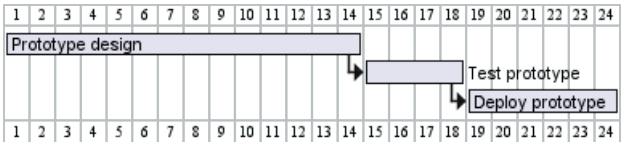
[Ref. QA-16188]

16.17 Simplified task succession

It's possible to use the `then` keyword to denote consecutive tasks.

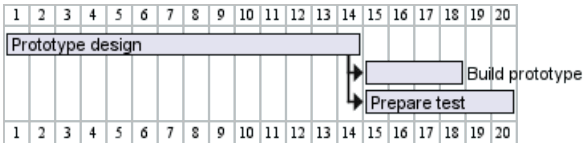
```
@startgantt
[Prototype design] lasts 14 days
then [Test prototype] lasts 4 days
```

```
then [Deploy prototype] lasts 6 days
@endgantt
```



You can also use arrow `->`

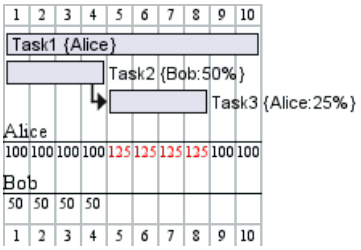
```
@startgantt
[Prototype design] lasts 14 days
[Build prototype] lasts 4 days
[Prepare test] lasts 6 days
[Prototype design] -> [Build prototype]
[Prototype design] -> [Prepare test]
@endgantt
```



16.18 Working with resources

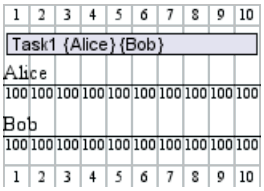
You can affect tasks on resources using the `on` keyword and brackets for resource name.

```
@startgantt
[Task1] on {Alice} lasts 10 days
[Task2] on {Bob:50%} lasts 2 days
then [Task3] on {Alice:25%} lasts 1 days
@endgantt
```



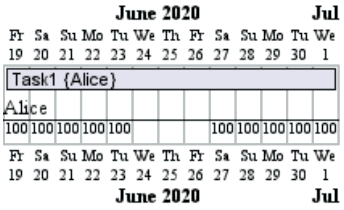
Multiple resources can be assigned to a task:

```
@startgantt
[Task1] on {Alice} {Bob} lasts 20 days
@endgantt
```



Resources can be marked as off on specific days:

```
@startgantt
project starts on 2020-06-19
[Task1] on {Alice} lasts 10 days
{Alice} is off on 2020-06-24 to 2020-06-26
@endgantt
```



16.19 Hide resources

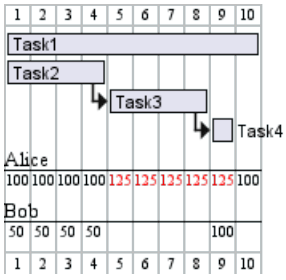
16.19.1 Without any hiding (by default)

```
@startgantt
[Task1] on {Alice} lasts 10 days
[Task2] on {Bob:50%} lasts 2 days
then [Task3] on {Alice:25%} lasts 1 days
then [Task4] on {Alice:25%} {Bob} lasts 1 days
@endgantt
```

16.19.2 Hide resources names

You can hide ressources names and percentage, on tasks, using the `hide ressources names` keywords.

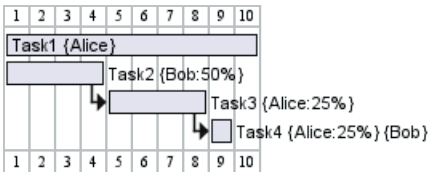
```
@startgantt
hide ressources names
[Task1] on {Alice} lasts 10 days
[Task2] on {Bob:50%} lasts 2 days
then [Task3] on {Alice:25%} lasts 1 days
then [Task4] on {Alice:25%} {Bob} lasts 1 days
@endgantt
```



16.19.3 Hide resources footbox

You can also hide ressources names on bottom of the diagram using the `hide ressources footbox` keywords.

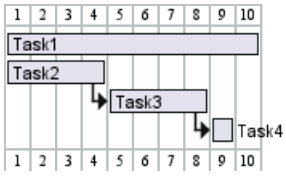
```
@startgantt
hide ressources footbox
[Task1] on {Alice} lasts 10 days
[Task2] on {Bob:50%} lasts 2 days
then [Task3] on {Alice:25%} lasts 1 days
then [Task4] on {Alice:25%} {Bob} lasts 1 days
@endgantt
```



16.19.4 Hide the both (resources names and resources footbox)

You can also hide the both.

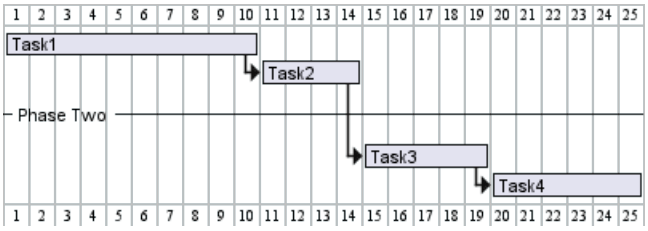
```
@startgantt
hide ressources names
hide ressources footbox
[Task1] on {Alice} lasts 10 days
[Task2] on {Bob:50%} lasts 2 days
then [Task3] on {Alice:25%} lasts 1 days
then [Task4] on {Alice:25%} {Bob} lasts 1 days
@endgantt
```



16.20 Horizontal Separator

You can use `--` to separate sets of tasks.

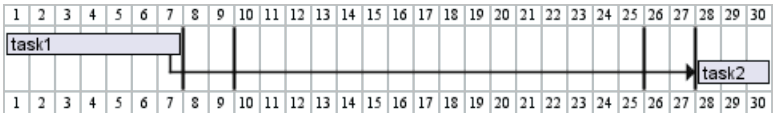
```
@startgantt
[Task1] lasts 10 days
then [Task2] lasts 4 days
-- Phase Two --
then [Task3] lasts 5 days
then [Task4] lasts 6 days
@endgantt
```



16.21 Vertical Separator

You can add Vertical Separators with the syntax: `Separator just [at]`.

```
@startgantt
[task1] lasts 1 week
[task2] starts 20 days after [task1]'s end and lasts 3 days

Separator just at [task1]'s end
Separator just 2 days after [task1]'s end

Separator just at [task2]'s start
Separator just 2 days before [task2]'s start
@endgantt
```



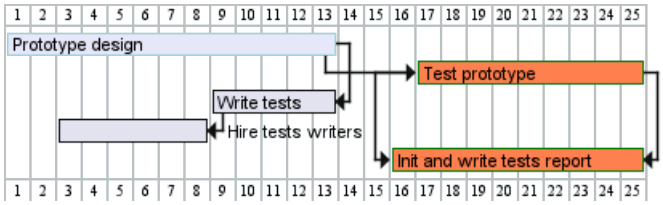
[Ref. QA-16247]

16.22 Complex example

It also possible to use the and conjunction.

You can also add delays in constraints.

```
@startgantt
[Prototype design] lasts 13 days and is colored in Lavender/LightBlue
[Test prototype] lasts 9 days and is colored in Coral/Green and starts 3 days after [Prototype desig
[Write tests] lasts 5 days and ends at [Prototype design]'s end
[Hire tests writers] lasts 6 days and ends at [Write tests]'s start
[Init and write tests report] is colored in Coral/Green
[Init and write tests report] starts 1 day before [Test prototype]'s start and ends at [Test prototy
@endgantt
```

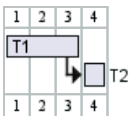


16.23 Comments

As is mentioned on Common Commands page: blockquote Everything that starts with `simple quote '` is a comment.

You can also put comments on several lines using `/'` to start and `'/` to end. blockquote *(i.e.: the first character (except space character) of a comment line must be a `simple quote '`)*

```
@startgantt
' This is a comment

[T1] lasts 3 days

/' this comment
is on several lines '/

[T2] starts at [T1]'s end and lasts 1 day
@endgantt
```

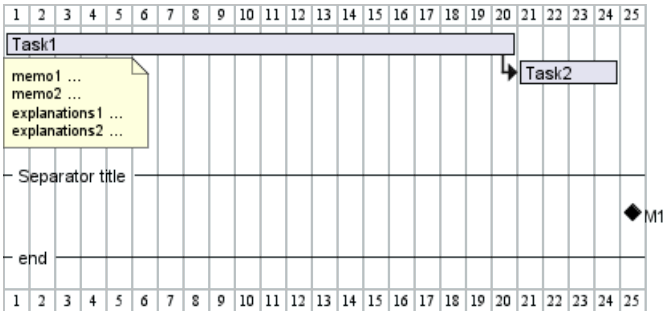


16.24 Using style

16.24.1 Without style (by default)

```
@startgantt
[Task1] lasts 20 days
note bottom
  memo1 ...
  memo2 ...
  explanations1 ...
```

```
  explanations2 ...
end note
[Task2] lasts 4 days
[Task1] -> [Task2]
-- Separator title --
[M1] happens on 5 days after [Task1]'s end
-- end --
@endgantt
```

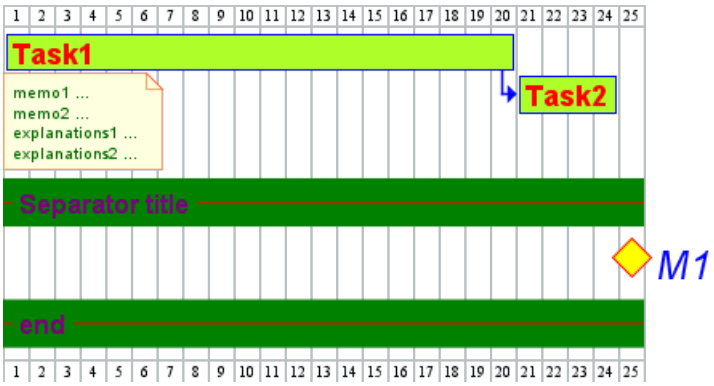


16.24.2 With style

You can use style to change rendering of elements.

```
@startgantt
<style>
ganttDiagram {
task {
FontName Helvetica
FontColor red
FontSize 18
FontStyle bold
BackGroundColor GreenYellow
LineColor blue
}
milestone {
FontColor blue
FontSize 25
FontStyle italic
BackGroundColor yellow
LineColor red
}
note {
FontColor DarkGreen
FontSize 10
LineColor OrangeRed
}
arrow {
FontName Helvetica
FontColor red
FontSize 18
FontStyle bold
BackGroundColor GreenYellow
LineColor blue
}
separator {
LineColor red
BackGroundColor green
FontSize 16
FontStyle bold
```

```
FontColor purple
}
}
</style>
[Task1] lasts 20 days
note bottom
  memo1 ...
  memo2 ...
  explanations1 ...
  explanations2 ...
end note
[Task2] lasts 4 days
[Task1] -> [Task2]
-- Separator title --
[M1] happens on 5 days after [Task1]'s end
-- end --
@endgantt
```

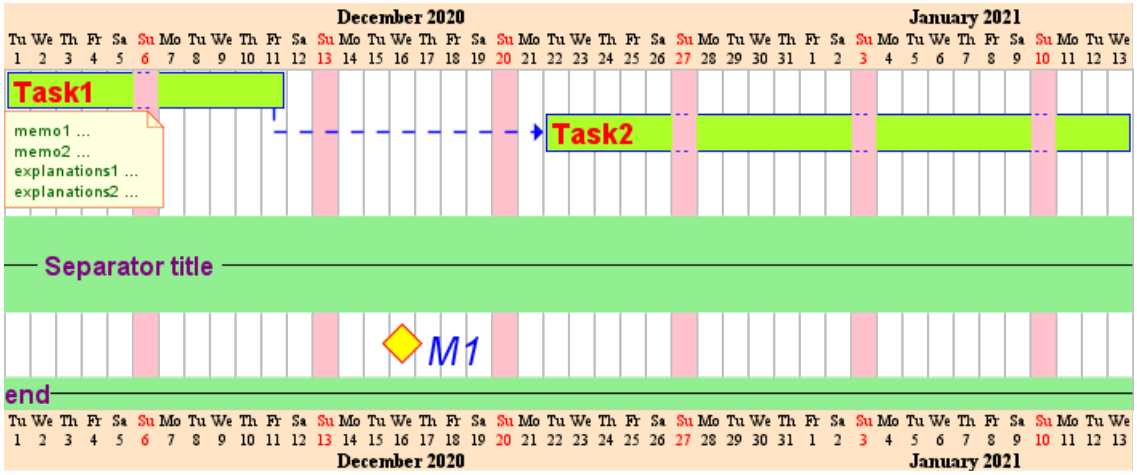


[Ref. QA-10835, QA-12045, QA-11877 and PR-438]

16.24.3 With style (full example)

```
@startgantt
<style>
ganttDiagram {
task {
FontName Helvetica
FontColor red
FontSize 18
FontStyle bold
BackGroundColor GreenYellow
LineColor blue
}
milestone {
FontColor blue
FontSize 25
FontStyle italic
BackGroundColor yellow
LineColor red
}
note {
FontColor DarkGreen
FontSize 10
LineColor OrangeRed
}
arrow {
FontName Helvetica
```

```
FontColor red
FontSize 18
FontStyle bold
BackGroundColor GreenYellow
LineColor blue
LineStyle 8.0;13.0
LineThickness 3.0
}
separator {
BackgroundColor lightGreen
LineStyle 8.0;3.0
LineColor red
LineThickness 1.0
FontSize 16
FontStyle bold
FontColor purple
Margin 5
Padding 20
}
timeline {
    BackgroundColor Bisque
}
closed {
BackgroundColor pink
FontColor red
}
}
</style>
Project starts the 2020-12-01

[Task1] lasts 10 days
sunday are closed

note bottom
  memo1 ...
  memo2 ...
  explanations1 ...
  explanations2 ...
end note

[Task2] lasts 20 days
[Task2] starts 10 days after [Task1]'s end
-- Separator title --
[M1] happens on 5 days after [Task1]'s end

<style>
separator {
    LineColor black
Margin 0
Padding 0
}
</style>

-- end --
@endgantt
```



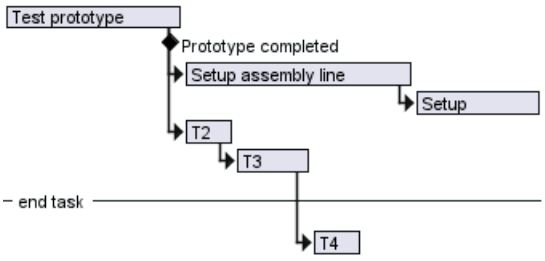
[Ref. QA-13570, QA-13672]

TODO: DONE *Thanks for style for Separator and all style for Arrow (thickness...)*

16.24.4 Clean style

With style, you can also clean a Gantt diagram *(showing tasks, dependencies and relative durations only - but no actual start date and no actual scale)*:

```
@startgantt
<style>
ganttDiagram {
  timeline {
    LineColor transparent
    FontColor transparent
 }
}
</style>

hide footbox
[Test prototype] lasts 7 days
[Prototype completed] happens at [Test prototype]'s end
[Setup assembly line] lasts 9 days
[Setup assembly line] starts at [Test prototype]'s end
then [Setup] lasts 5 days
[T2] lasts 2 days and starts at [Test prototype]'s end
then [T3] lasts 3 days
-- end task --
then [T4] lasts 2 days
@endgantt
```

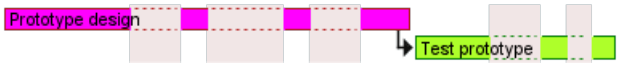


[Ref. QA-13971]

Or:

```
@startgantt
```

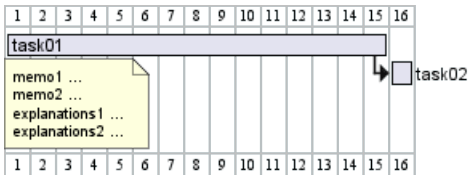
```
<style>
ganttDiagram {
  timeline {
    LineColor transparent
    FontColor transparent
  }
  closed {
    FontColor transparent
  }
}
</style>

hide footbox
project starts the 2018/04/09
saturday are closed
sunday are closed
2018/05/01 is closed
2018/04/17 to 2018/04/19 is closed
[Prototype design] lasts 9 days
[Test prototype] lasts 5 days
[Test prototype] starts at [Prototype design]'s end
[Prototype design] is colored in Fuchsia/FireBrick
[Test prototype] is colored in GreenYellow/Green
@endgantt
```



[Ref. QA-13464]

16.25 Add notes

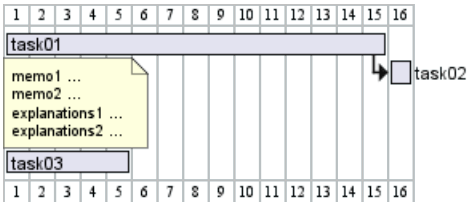
```
@startgantt
[task01] lasts 15 days
note bottom
  memo1 ...
  memo2 ...
  explanations1 ...
  explanations2 ...
end note

[task01] -> [task02]

@endgantt
```



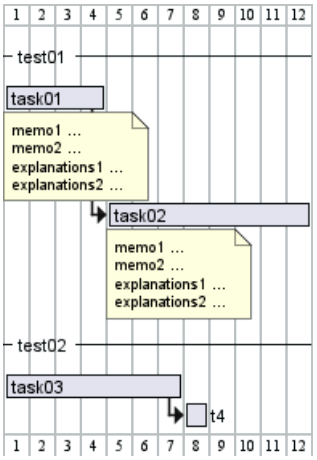
Example with overlap.

```
@startgantt
[task01] lasts 15 days
note bottom
  memo1 ...
  memo2 ...
```

```
  explanations1 ...
  explanations2 ...
end note

[task01] -> [task02]
[task03] lasts 5 days

@endgantt
```

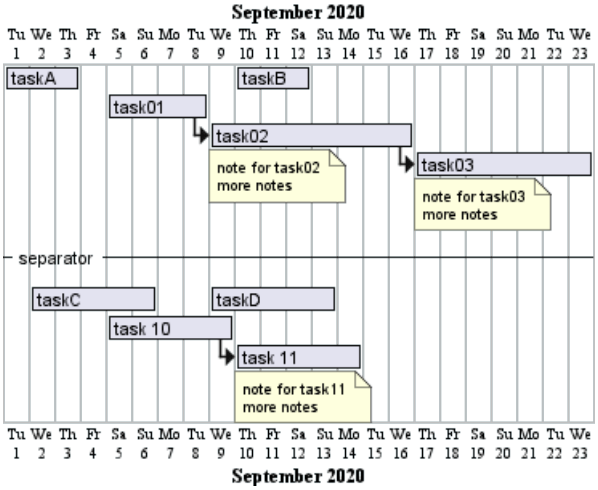



```
@startgantt

-- test01 --

[task01] lasts 4 days
note bottom
'note left
memo1 ...
memo2 ...
explanations1 ...
explanations2 ...
end note

[task02] lasts 8 days
[task01] -> [task02]
note bottom
'note left
memo1 ...
memo2 ...
explanations1 ...
explanations2 ...
end note
-- test02 --

[task03] as [t3] lasts 7 days
[t3] -> [t4]
@endgantt
```



TODO: DONE *Thanks for correction (of #386 on v1.2020.18) when overlapping*

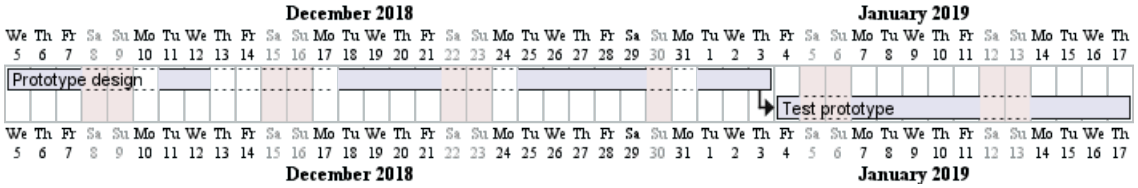
```
@startgantt

Project starts 2020-09-01

[taskA] starts 2020-09-01 and lasts 3 days
[taskB] starts 2020-09-10 and lasts 3 days
[taskB] displays on same row as [taskA]

[task01] starts 2020-09-05 and lasts 4 days

then [task02] lasts 8 days
note bottom
  note for task02
  more notes
end note

then [task03] lasts 7 days
note bottom
  note for task03
  more notes
end note

-- separator --

[taskC] starts 2020-09-02 and lasts 5 days
[taskD] starts 2020-09-09 and lasts 5 days
[taskD] displays on same row as [taskC]

[task 10] starts 2020-09-05 and lasts 5 days
then [task 11] lasts 5 days
note bottom
  note for task11
  more notes
end note
@endgantt
```



16.26 Pause tasks

```
@startgantt
Project starts the 5th of december 2018
saturday are closed
```

```
sunday are closed
2018/12/29 is opened
[Prototype design] lasts 17 days
[Prototype design] pauses on 2018/12/13
[Prototype design] pauses on 2018/12/14
[Prototype design] pauses on monday
[Test prototype] starts at [Prototype design]'s end and lasts 2 weeks
@endgantt
```

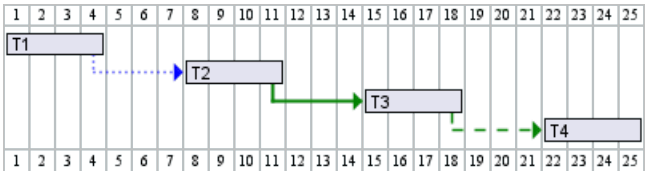


16.27 Change link colors

You can change link colors:

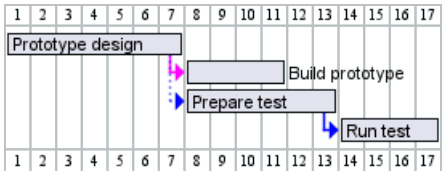
- with this syntax: `with <color> <style> link`

```
@startgantt
[T1] lasts 4 days
[T2] lasts 4 days and starts 3 days after [T1]'s end with blue dotted link
[T3] lasts 4 days and starts 3 days after [T2]'s end with green bold link
[T4] lasts 4 days and starts 3 days after [T3]'s end with green dashed link
@endgantt
```



- or directly by using arrow style

```
@startgantt
<style>
ganttDiagram {
arrow {
LineColor blue
}
}
</style>
[Prototype design] lasts 7 days
[Build prototype] lasts 4 days
[Prepare test] lasts 6 days
[Prototype design] -[#FF00FF]-> [Build prototype]
[Prototype design] -[dotted]-> [Prepare test]
Then [Run test]  lasts 4 days
@endgantt
```



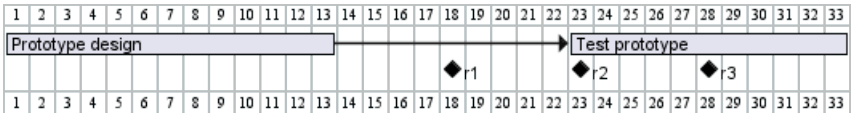
[Ref. QA-13693]

16.28 Tasks or Milestones on the same line

You can put Tasks or Milestones on the same line, with this syntax:

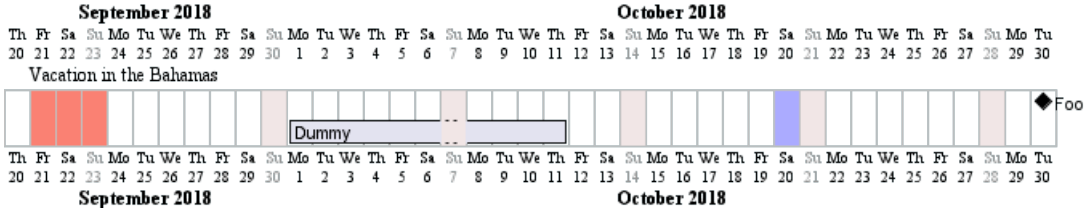
- `[T|M] displays on same row as [T|M]`

```
@startgantt
[Prototype design] lasts 13 days
[Test prototype] lasts 4 days and 1 week
[Test prototype] starts 1 week and 2 days after [Prototype design]'s end
[Test prototype] displays on same row as [Prototype design]
[r1] happens on 5 days after [Prototype design]'s end
[r2] happens on 5 days after [r1]'s end
[r3] happens on 5 days after [r2]'s end
[r2] displays on same row as [r1]
[r3] displays on same row as [r1]
@endgantt
```



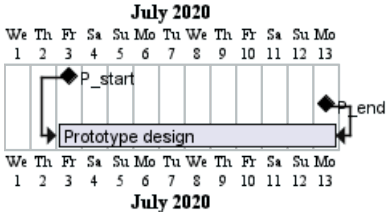
16.29 Highlight today

```
@startgantt
Project starts the 20th of september 2018
sunday are close
2018/09/21 to 2018/09/23 are colored in salmon
2018/09/21 to 2018/09/30 are named [Vacation in the Bahamas]

today is 30 days after start and is colored in #AAF
[Foo] happens 40 days after start
[Dummy] lasts 10 days and starts 10 days after start

@endgantt
```



16.30 Task between two milestones

```
@startgantt
project starts on 2020-07-01
[P_start] happens 2020-07-03
[P_end]   happens 2020-07-13
[Prototype design] occurs from [P_start] to [P_end]
@endgantt
```

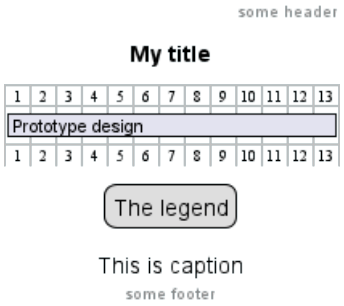


16.31 Grammar and verbal form

Verbal form	Example
[T] starts	
[M] happens	

16.32 Add title, header, footer, caption or legend

```
@startgantt

header some header

footer some footer

title My title

[Prototype design] lasts 13 days

legend
The legend
end legend

caption This is caption

@endgantt
```



(See also: Common commands)

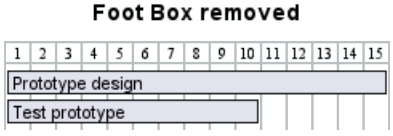
16.33 Removing Foot Boxes (example for all scale)

You can use the `hide footbox` keywords to remove the foot boxes of the gantt diagram *(as for sequence diagram)*.

Examples on:

- daily scale *(without project start)*

```
@startgantt

hide footbox
title Foot Box removed

[Prototype design] lasts 15 days
[Test prototype] lasts 10 days
@endgantt
```

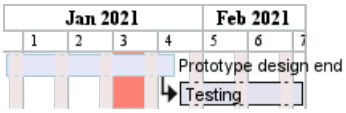


- daily scale

```
@startgantt

Project starts the 20th of september 2017
[Prototype design] as [TASK1] lasts 13 days
[TASK1] is colored in Lavender/LightBlue

hide footbox
@endgantt
```

- weekly scale

```
@startgantt
hide footbox

printscale weekly
saturday are closed
sunday are closed

Project starts the 1st of january 2021
[Prototype design end] as [TASK1] lasts 19 days
[TASK1] is colored in Lavender/LightBlue
[Testing] lasts 14 days
[TASK1]->[Testing]

2021-01-18 to 2021-01-22 are named [End's committee]
2021-01-18 to 2021-01-22 are colored in salmon
@endgantt
```



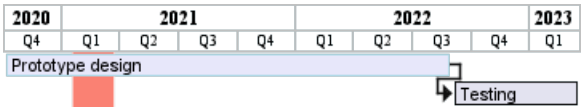
- monthly scale

```
@startgantt

hide footbox

projectscale monthly
Project starts the 20th of september 2020
[Prototype design] as [TASK1] lasts 130 days
[TASK1] is colored in Lavender/LightBlue
[Testing] lasts 20 days
[TASK1]->[Testing]

2021-01-18 to 2021-01-22 are named [End's committee]
2021-01-18 to 2021-01-22 are colored in salmon
@endgantt
```

- quarterly scale

```
@startgantt
```

```
hide footbox

projectscale quarterly
Project starts the 1st of october 2020
[Prototype design] as [TASK1] lasts 700 days
[TASK1] is colored in Lavender/LightBlue
[Testing] lasts 200 days
[TASK1]->[Testing]

2021-01-18 to 2021-03-22 are colored in salmon
@endgantt
```



- yearly scale

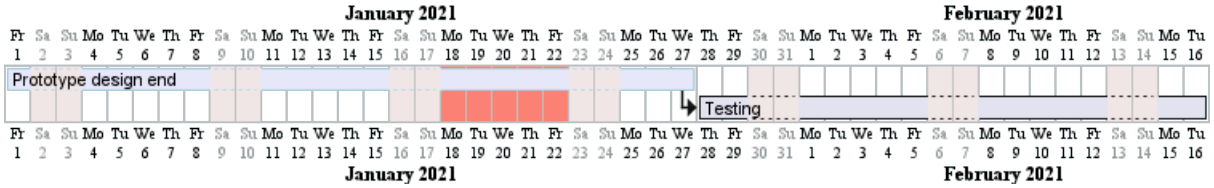
```
@startgantt

hide footbox

projectscale yearly
Project starts the 1st of october 2020
[Prototype design] as [TASK1] lasts 700 days
[TASK1] is colored in Lavender/LightBlue
[Testing] lasts 200 days
[TASK1]->[Testing]

2021-01-18 to 2021-03-22 are colored in salmon
@endgantt
```

16.34 Language of the calendar

You can choose the language of the Gantt calendar, with the `language <xx>` command where `<xx>` is the ISO 639 code of the language.

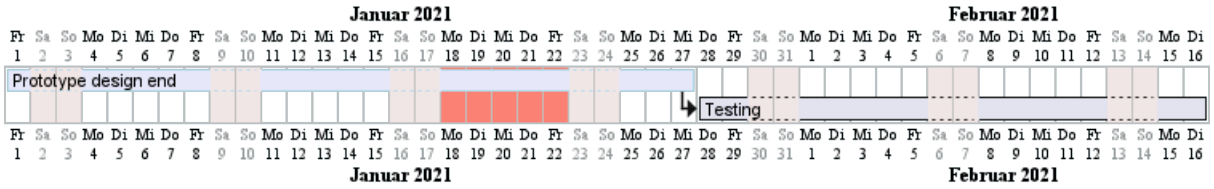
16.34.1 English *(en, by default)*

```
@startgantt
saturday are closed
sunday are closed

Project starts 2021-01-01
[Prototype design end] as [TASK1] lasts 19 days
[TASK1] is colored in Lavender/LightBlue
[Testing] lasts 14 days
[TASK1]->[Testing]

2021-01-18 to 2021-01-22 are colored in salmon
@endgantt
```



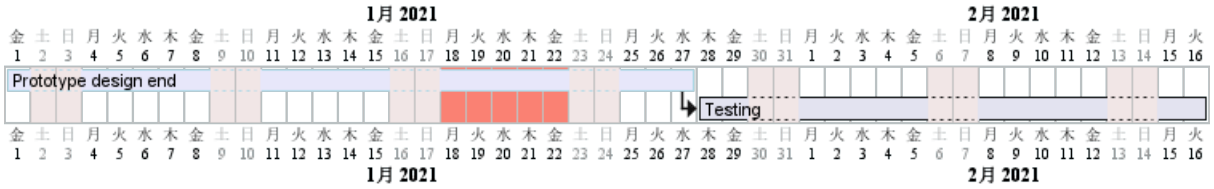
16.34.2 Deutsch (de)

```
@startgantt
language de
saturday are closed
sunday are closed

Project starts 2021-01-01
[Prototype design end] as [TASK1] lasts 19 days
[TASK1] is colored in Lavender/LightBlue
[Testing] lasts 14 days
[TASK1]->[Testing]

2021-01-18 to 2021-01-22 are colored in salmon
@endgantt
```



16.34.3 Japanese (ja)

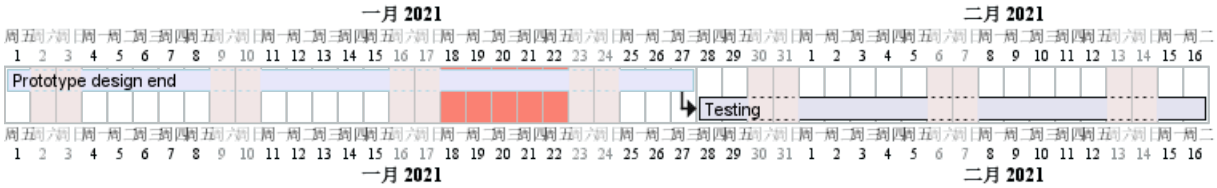
```
@startgantt
language ja
saturday are closed
sunday are closed

Project starts 2021-01-01
[Prototype design end] as [TASK1] lasts 19 days
[TASK1] is colored in Lavender/LightBlue
[Testing] lasts 14 days
[TASK1]->[Testing]

2021-01-18 to 2021-01-22 are colored in salmon
@endgantt
```



16.34.4 Chinese (zh)

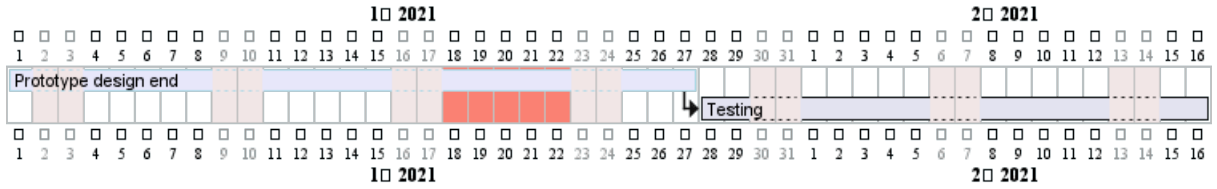
```
@startgantt
language zh
saturday are closed
sunday are closed
```

```
Project starts 2021-01-01
[Prototype design end] as [TASK1] lasts 19 days
[TASK1] is colored in Lavender/LightBlue
[Testing] lasts 14 days
[TASK1]->[Testing]

2021-01-18 to 2021-01-22 are colored in salmon
@endgantt
```



16.34.5 Korean (ko)

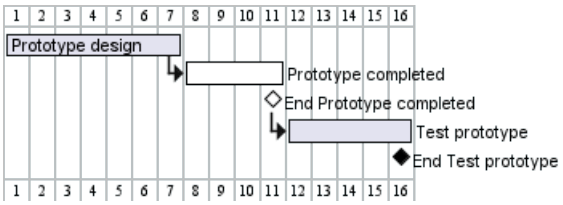
```
@startgantt
language ko
saturday are closed
sunday are closed

Project starts 2021-01-01
[Prototype design end] as [TASK1] lasts 19 days
[TASK1] is colored in Lavender/LightBlue
[Testing] lasts 14 days
[TASK1]->[Testing]

2021-01-18 to 2021-01-22 are colored in salmon
@endgantt
```



16.35 Delete Tasks or Milestones

You can mark some Tasks or Milestones as `deleted` instead of normally completed to distinguish tasks that may possibly have been discarded, postponed or whatever.

```
@startgantt
[Prototype design] lasts 1 weeks
then [Prototype completed]  lasts 4 days
[End Prototype completed] happens at [Prototype completed]'s end
then [Test prototype] lasts 5 days
[End Test prototype] happens at [Test prototype]'s end

[Prototype completed] is deleted
[End Prototype completed] is deleted
@endgantt
```

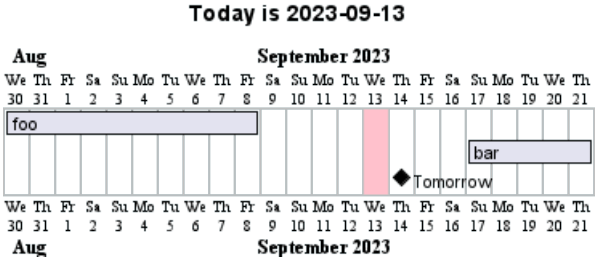


[Ref. QA-9129]

16.36 Start a project, a task or a milestone a number of days before or after today

You can start a project, a task or a milestone a number of days before or after today, using the builtin functions `%now` and `%date`:

```
@startgantt
title Today is %date("YYYY-MM-dd")
!$now = %now()
!$past = %date("YYYY-MM-dd", $now - 14*24*3600)
Project starts $past
today is colored in pink
[foo] lasts 10 days
[bar] lasts 5 days and starts %date("YYYY-MM-dd", $now + 4*24*3600)
[Tomorrow] happens %date("YYYY-MM-dd", $now + 1*24*3600)
@endgantt
```

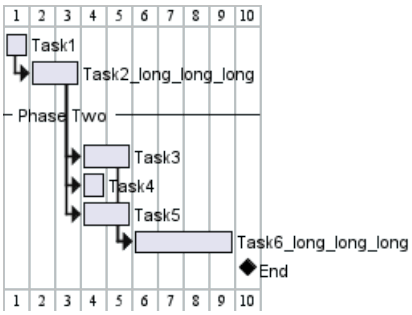


[Ref. QA-16285]

16.37 Change Label position

16.37.1 The labels are near elements *(by default)*

```
@startgantt
[Task1] lasts 1 days
then [Task2_long_long_long] as [T2] lasts 2 days
-- Phase Two --
then [Task3] as [T3] lasts 2 days
[Task4] as [T4] lasts 1 day
[Task5] as [T5] lasts 2 days
[T2] -> [T4]
[T2] -> [T5]
[Task6_long_long_long] as [T6] lasts 4 days
[T3] -> [T6]
[T5] -> [T6]
[End] happens 1 day after [T6]'s end
@endgantt
```

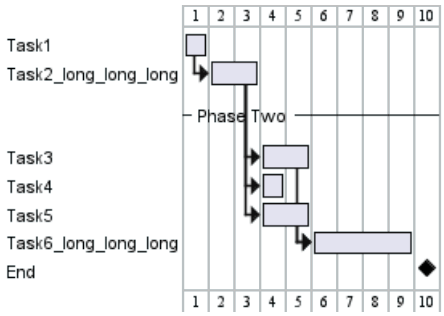


To change the label position, you can use the command `label`:

16.37.2 Label on first column

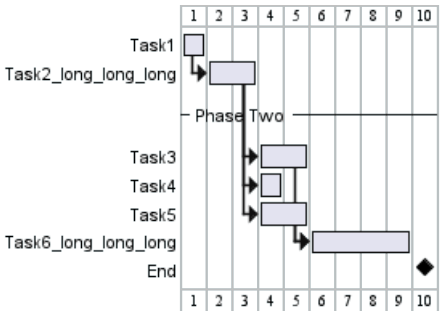
- Left aligned

```
@startgantt
Label on first column and left aligned
[Task1] lasts 1 days
then [Task2_long_long_long] as [T2] lasts 2 days
-- Phase Two --
then [Task3] as [T3] lasts 2 days
[Task4] as [T4] lasts 1 day
[Task5] as [T5] lasts 2 days
[T2] -> [T4]
[T2] -> [T5]
[Task6_long_long_long] as [T6] lasts 4 days
[T3] -> [T6]
[T5] -> [T6]
[End] happens 1 day after [T6]'s end
@endgantt
```



- Right aligned

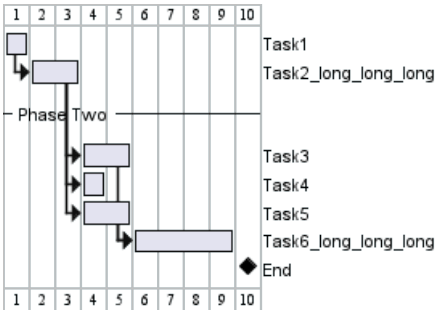
```
@startgantt
Label on first column and right aligned
[Task1] lasts 1 days
then [Task2_long_long_long] as [T2] lasts 2 days
-- Phase Two --
then [Task3] as [T3] lasts 2 days
[Task4] as [T4] lasts 1 day
[Task5] as [T5] lasts 2 days
[T2] -> [T4]
[T2] -> [T5]
[Task6_long_long_long] as [T6] lasts 4 days
[T3] -> [T6]
[T5] -> [T6]
[End] happens 1 day after [T6]'s end
@endgantt
```



16.37.3 Label on last column

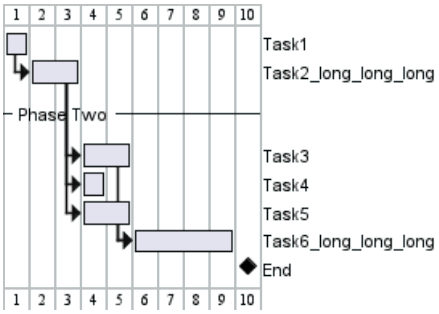
- Left aligned

```
@startgantt
Label on last column and left aligned
[Task1] lasts 1 days
then [Task2_long_long_long] as [T2] lasts 2 days
-- Phase Two --
then [Task3] as [T3] lasts 2 days
[Task4] as [T4] lasts 1 day
[Task5] as [T5] lasts 2 days
[T2] -> [T4]
[T2] -> [T5]
[Task6_long_long_long] as [T6] lasts 4 days
[T3] -> [T6]
[T5] -> [T6]
[End] happens 1 day after [T6]'s end
@endgantt
```



- Right aligned

```
@startgantt
Label on last column and right aligned
[Task1] lasts 1 days
then [Task2_long_long_long] as [T2] lasts 2 days
-- Phase Two --
then [Task3] as [T3] lasts 2 days
[Task4] as [T4] lasts 1 day
[Task5] as [T5] lasts 2 days
[T2] -> [T4]
[T2] -> [T5]
[Task6_long_long_long] as [T6] lasts 4 days
[T3] -> [T6]
[T5] -> [T6]
[End] happens 1 day after [T6]'s end
@endgantt
```


1
2
3
4
5
6
7
8
9
10
Task1
Task2_long_long_long
Phase Two
Task3
Task4
Task5
Task6_long_long_long
End

[Ref. QA-12433]

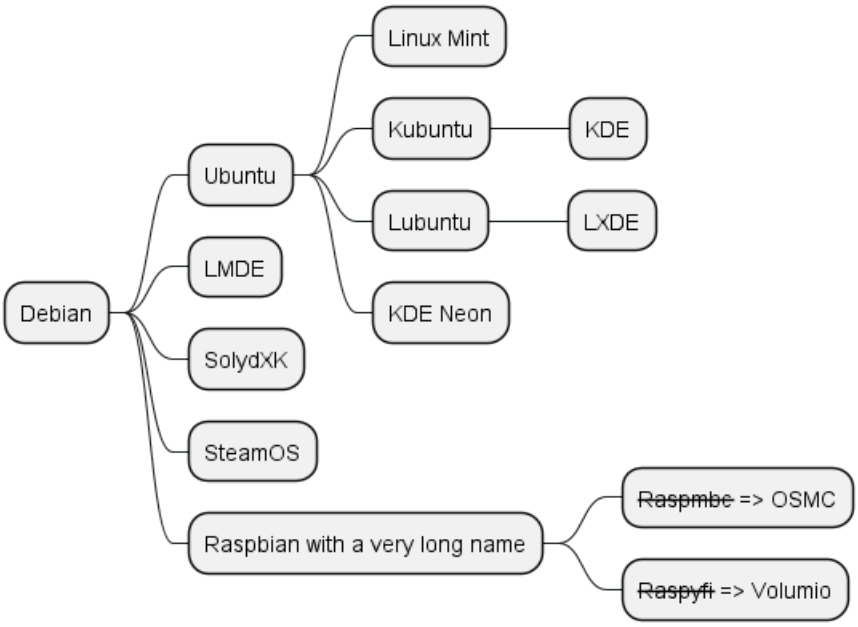
17 MindMap

MindMap Diagramme sind immernoch in der Beta: Die Syntax kann sich jederzeit ohne Vorankündigung ändern.

17.1 OrgMode Syntax

Diese Syntax ist mit dem OrgMode kompatibel

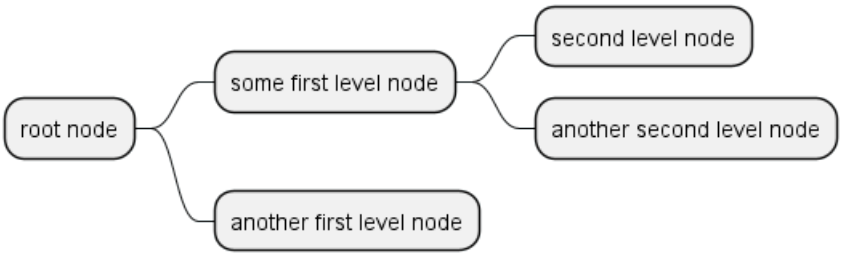
```
@startmindmap
* Debian
** Ubuntu
*** Linux Mint
*** Kubuntu
**** KDE
*** Lubuntu
**** LXDE
*** KDE Neon
** LMDE
** SolydXK
** SteamOS
** Raspbian with a very long name
*** <s>Raspmbc</s> => OSMC
*** <s>Raspyfi</s> => Volumio
@endmindmap
```



17.2 Markdown syntax

This syntax is compatible with Markdown

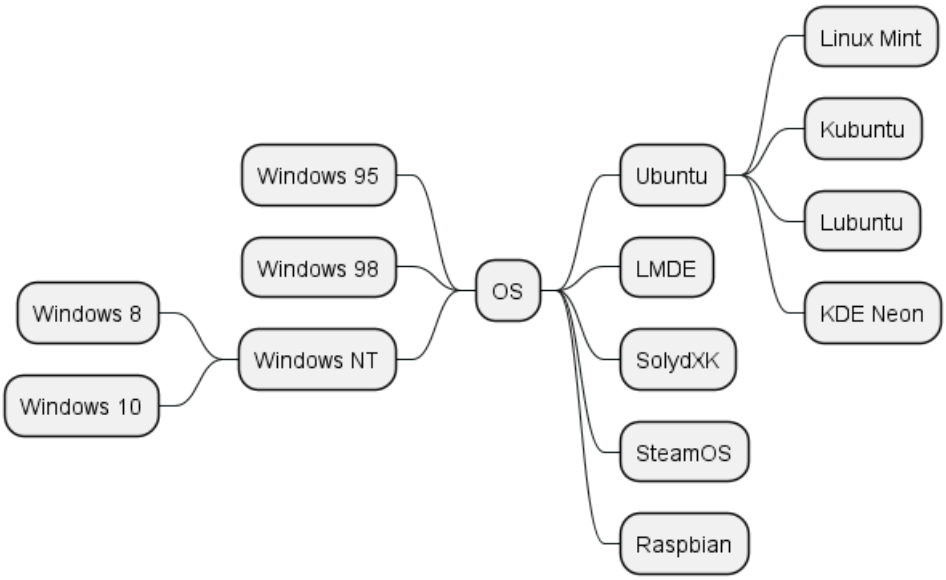
```
@startmindmap
* root node
* some first level node
* second level node
* another second level node
* another first level node
@endmindmap
```



17.3 Arithmetic notation

You can use the following notation to choose diagram side.

```
@startmindmap
+ OS
++ Ubuntu
+++ Linux Mint
+++ Kubuntu
+++ Lubuntu
+++ KDE Neon
++ LMDE
++ SolydXK
++ SteamOS
++ Raspbian
-- Windows 95
-- Windows 98
-- Windows NT
--- Windows 8
--- Windows 10
@endmindmap
```

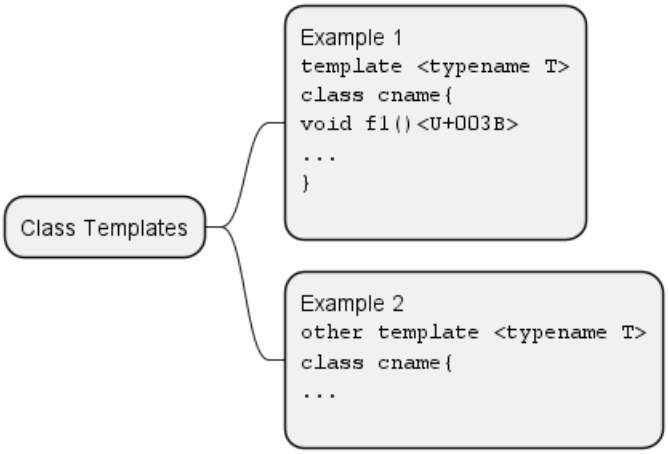


17.4 Multilines

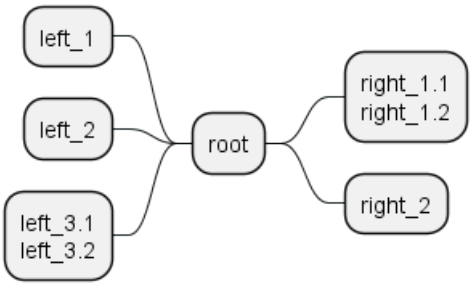
You can use : and ; to have multilines box.

```
@startmindmap
* Class Templates
```

```
**:Example 1
<code>
template <typename T>
class cname{
void f1()<U+003B>
...
}
</code>
;
**:Example 2
<code>
other template <typename T>
class cname{
...
</code>
;
@endmindmap
```



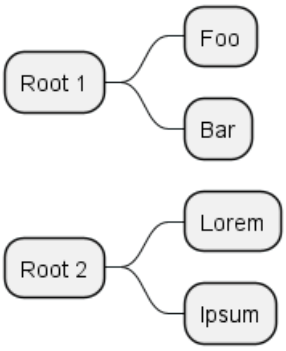

```
@startmindmap
+ root
**:right_1.1
right_1.2;
++ right_2

left side

-- left_1
-- left_2
**:left_3.1
left_3.2;
@endmindmap
```



17.5 Multiroot Mindmap

You can create multiroot mindmap, as:

```
@startmindmap
* Root 1
** Foo
** Bar
* Root 2
** Lorem
** Ipsum
@endmindmap
```



[Ref. QH-773]

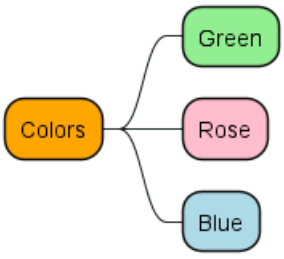
17.6 Colors

It is possible to change node color.

17.6.1 With inline color

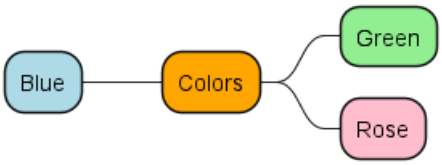
- OrgMode syntax mindmap

```
@startmindmap
*[#Orange] Colors
**[#lightgreen] Green
**[#FFBBCC] Rose
**[#lightblue] Blue
@endmindmap
```



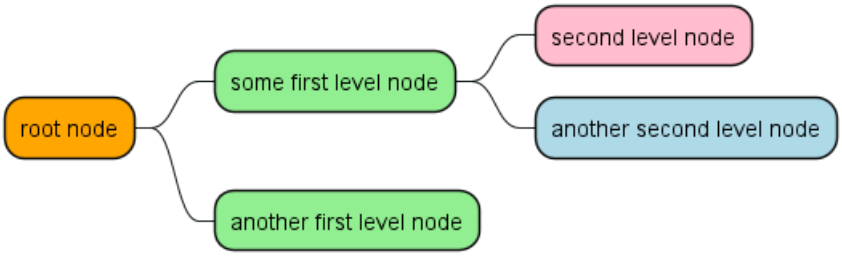
- Arithmetic notation syntax mindmap

```
@startmindmap
+[#Orange] Colors
++[#lightgreen] Green
++[#FFBBCC] Rose
--[#lightblue] Blue
@endmindmap
```



- Markdown syntax mindmap

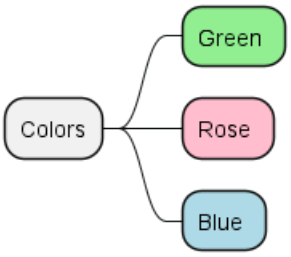
```
@startmindmap
*[#Orange] root node
 *[#lightgreen] some first level node
  *[#FFBBCC] second level node
  *[#lightblue] another second level node
 *[#lightgreen] another first level node
@endmindmap
```



17.6.2 With style color

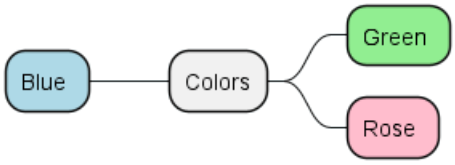
- OrgMode syntax mindmap

```
@startmindmap
<style>
mindmapDiagram {
  .green {
    BackgroundColor lightgreen
  }
  .rose {
    BackgroundColor #FFBBCC
  }
  .your_style_name {
    BackgroundColor lightblue
  }
}
</style>
* Colors
** Green <<green>>
** Rose <<rose>>
** Blue <<your_style_name>>
@endmindmap
```



- Arithmetic notation syntax mindmap

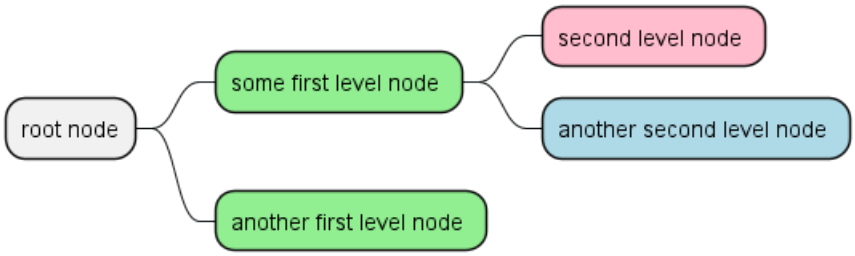
```
@startmindmap
<style>
mindmapDiagram {
  .green {
    BackgroundColor lightgreen
  }
  .rose {
    BackgroundColor #FFBBCC
  }
  .your_style_name {
    BackgroundColor lightblue
  }
}
</style>
+ Colors
++ Green <<green>>
++ Rose <<rose>>
-- Blue <<your_style_name>>
@endmindmap
```



- Markdown syntax mindmap

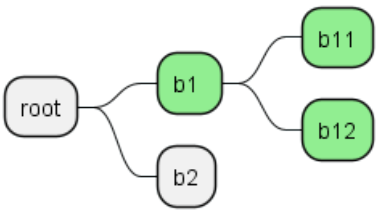
```
@startmindmap
<style>
mindmapDiagram {
  .green {
    BackgroundColor lightgreen
  }
  .rose {
    BackgroundColor #FFBBCC
  }
  .your_style_name {
    BackgroundColor lightblue
  }
}
</style>
* root node
 * some first level node <<green>>
  * second level node <<rose>>
  * another second level node <<your_style_name>>
```

```
 * another first level node <<green>>
@endmindmap
```



- Apply style to a branch

```
@startmindmap
<style>
mindmapDiagram {
  .myStyle * {
    BackgroundColor lightgreen
  }
}
</style>
+ root
++ b1 <<myStyle>>
+++ b11
+++ b12
++ b2
@endmindmap
```

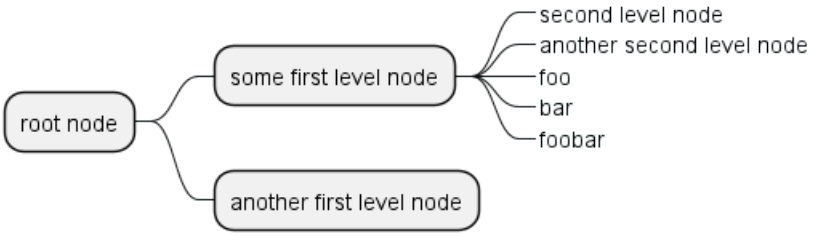


[Ref. GA-920]

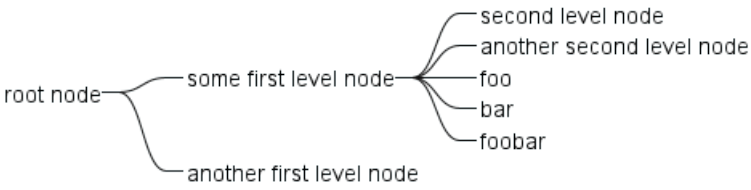
17.7 Removing box

You can remove the box drawing using an underscore.

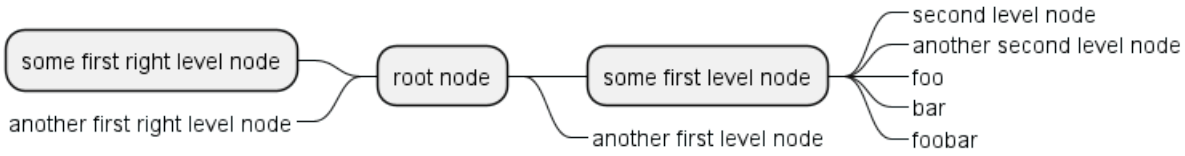
```
@startmindmap
* root node
** some first level node
***_ second level node
***_ another second level node
***_ foo
***_ bar
***_ foobar
** another first level node
@endmindmap
```




```
@startmindmap
*_ root node
**_ some first level node
***_ second level node
***_ another second level node
***_ foo
***_ bar
***_ foobar
**_ another first level node
@endmindmap
```




```
@startmindmap
+ root node
++ some first level node
+++_ second level node
+++_ another second level node
+++_ foo
+++_ bar
+++_ foobar
++_ another first level node
-- some first right level node
--_ another first right level node
@endmindmap
```

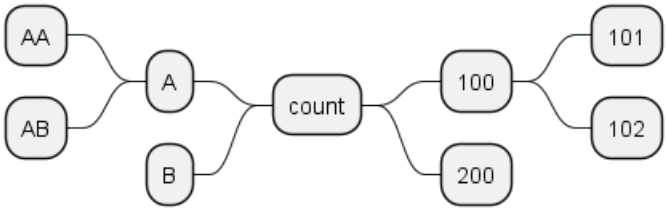


17.8 Changing diagram direction

It is possible to use both sides of the diagram.

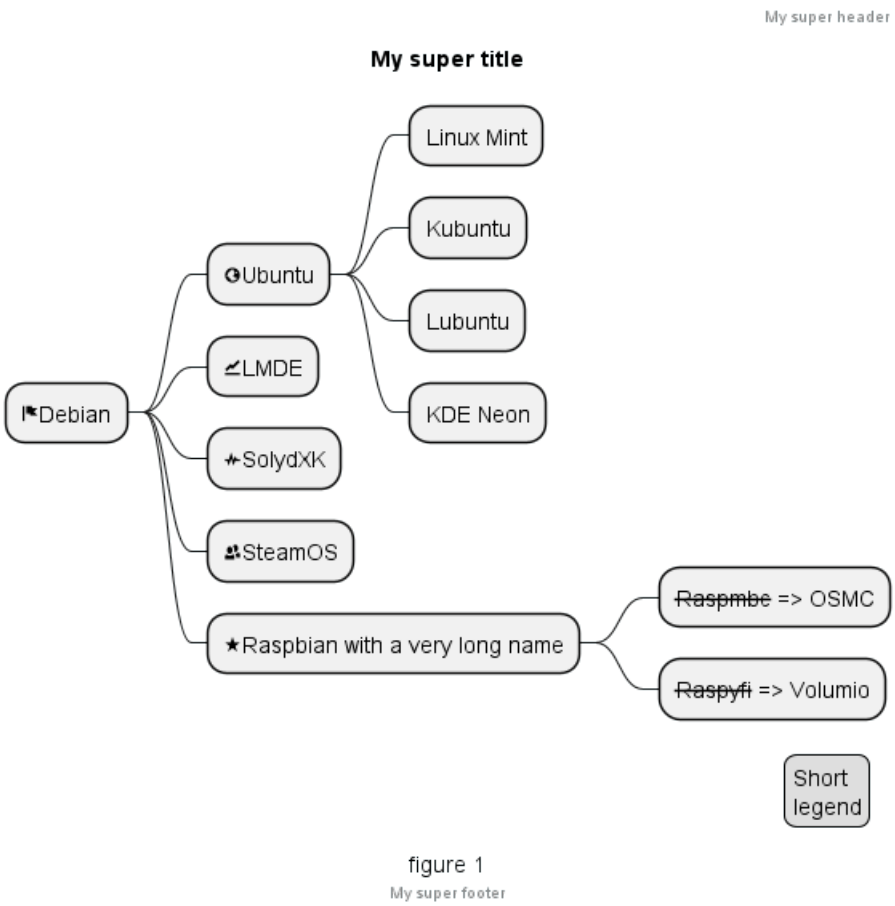
```
@startmindmap
* count
** 100
*** 101
*** 102
** 200
```

```
left side

** A
*** AA
*** AB
** B
@endmindmap
```



17.9 Complete example

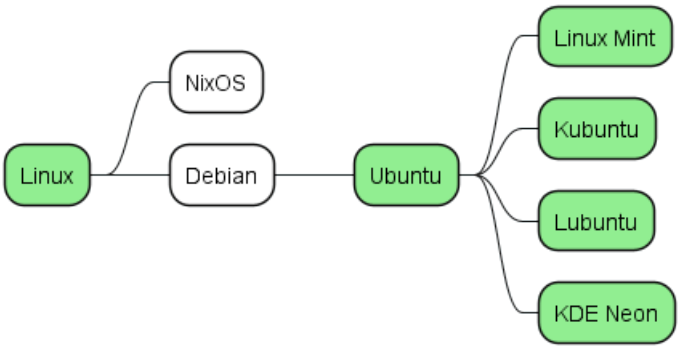
```
@startmindmap
caption figure 1
title My super title

* <&flag>Debian
** <&globe>Ubuntu
*** Linux Mint
*** Kubuntu
*** Lubuntu
*** KDE Neon
** <&graph>LMDE
** <&pulse>SolydXK
** <&people>SteamOS
** <&star>Raspbian with a very long name
*** <s>Raspmbc</s> => OSMC
*** <s>Raspyfi</s> => Volumio

header
My super header
endheader

center footer My super footer

legend right
  Short
  legend
endlegend
@endmindmap
```



17.10 Changing style

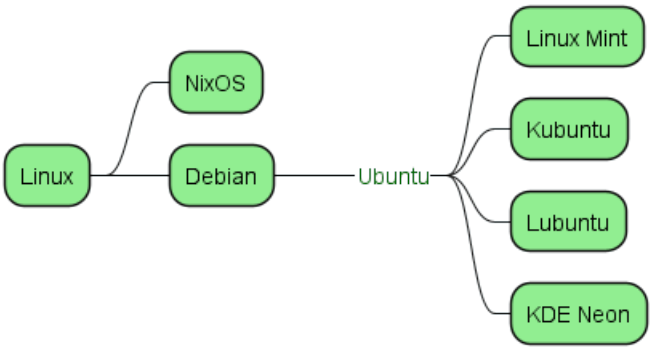
17.10.1 node, depth

```
@startmindmap
<style>
mindmapDiagram {
    node {
        BackgroundColor lightGreen
    }
    :depth(1) {
      BackGroundColor white
    }
}
</style>
* Linux
** NixOS
** Debian
*** Ubuntu
**** Linux Mint
**** Kubuntu
**** Lubuntu
**** KDE Neon
@endmindmap
```



17.10.2 boxless

```
@startmindmap
<style>
mindmapDiagram {
  node {
    BackgroundColor lightGreen
  }
  boxless {
    FontColor darkgreen
  }
}
</style>
* Linux
** NixOS
** Debian
***_ Ubuntu
**** Linux Mint
**** Kubuntu
**** Lubuntu
**** KDE Neon
@endmindmap
```

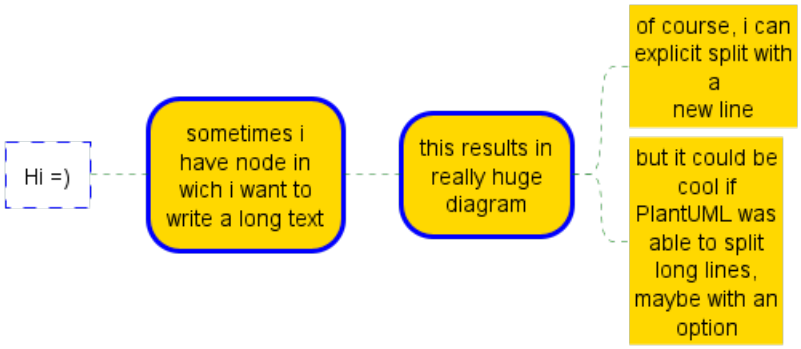


17.11 Word Wrap

Using `MaximumWidth` setting you can control automatic word wrap. Unit used is pixel.

```
@startmindmap


<style>
node {
```

```
    Padding 12
    Margin 3
    HorizontalAlignment center
    LineColor blue
    LineThickness 3.0
    BackgroundColor gold
    RoundCorner 40
    MaximumWidth 100
}

rootNode {
    LineStyle 8.0;3.0
    LineColor red
    BackgroundColor white
    LineThickness 1.0
    RoundCorner 0
    Shadowing 0.0
}

leafNode {
    LineColor gold
    RoundCorner 0
    Padding 3
}

arrow {
    LineStyle 4
    LineThickness 0.5
    LineColor green
}
</style>

* Hi =)
** sometimes i have node in wich i want to write a long text
*** this results in really huge diagram
**** of course, i can explicit split with a\nnew line
**** but it could be cool if PlantUML was able to split long lines, maybe with an option

@endmindmap
```



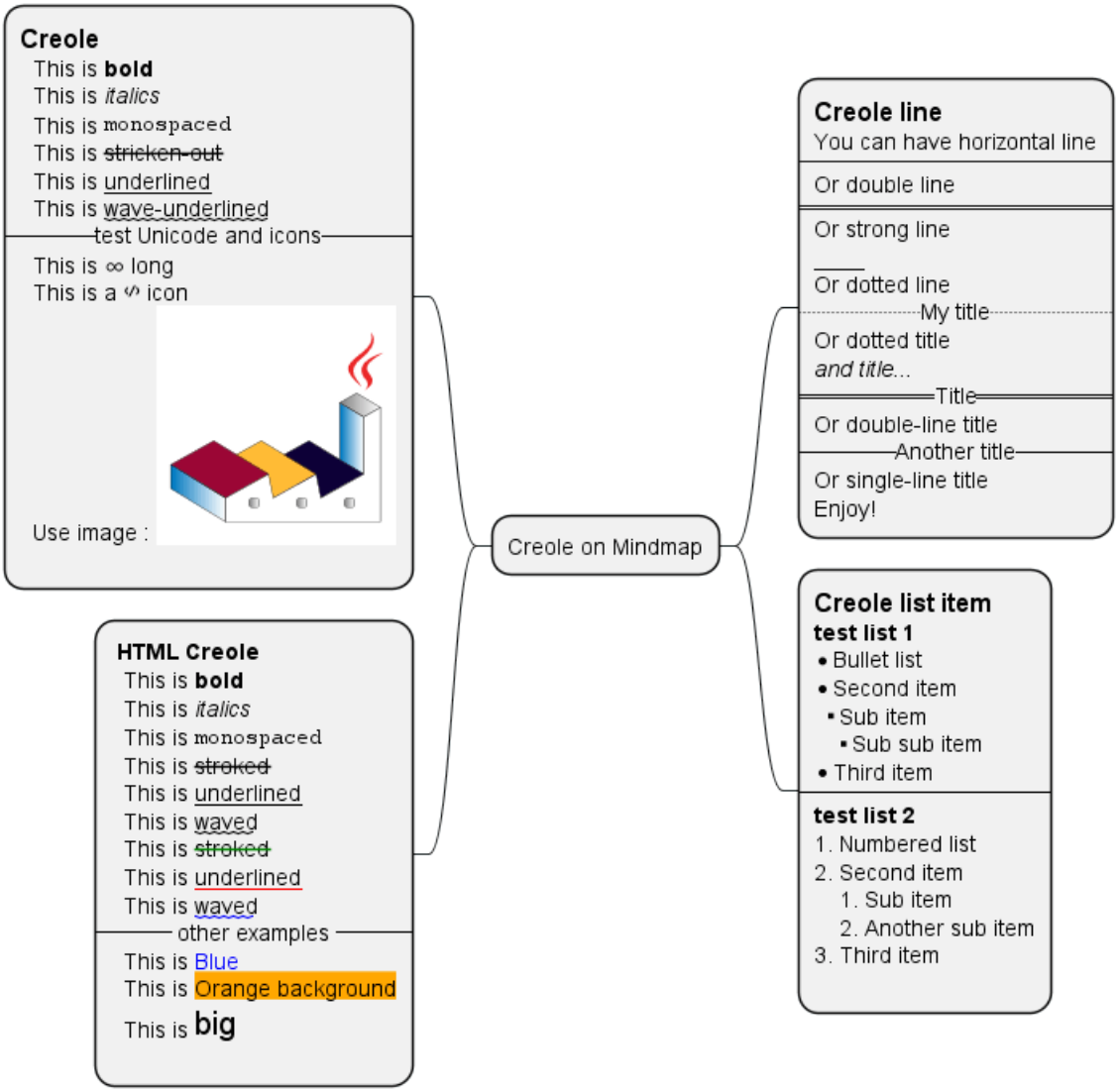
17.12 Creole on Mindmap diagram

You can use Creole or HTML Creole on Mindmap:

```
@startmindmap
* Creole on Mindmap
```

```
left side
**:==Creole
  This is **bold**
  This is //italics//
  This is ""monospaced""
  This is --stricken-out--
  This is __underlined__
  This is ~~wave-underlined~~
--test Unicode and icons--
  This is <U+221E> long
  This is a <&code> icon
  Use image : <img:http://plantuml.com/logo3.png>
;
**: <b>HTML Creole
  This is <b>bold</b>
  This is <i>italics</i>
  This is <font:monospaced>monospaced</font>
  This is <s>stroked</s>
  This is <u>underlined</u>
  This is <w>waved</w>
  This is <s:green>stroked</s>
  This is <u:red>underlined</u>
  This is <w:#0000FF>waved</w>
-- other examples --
  This is <color:blue>Blue</color>
  This is <back:orange>Orange background</back>
  This is <size:20>big</size>
;
right side
**:==Creole line
You can have horizontal line
----
Or double line
====
Or strong line
____
Or dotted line
..My title..
Or dotted title
//and title... //
==Title==
Or double-line title
--Another title--
Or single-line title
Enjoy!;
**:==Creole list item
**test list 1**
* Bullet list
* Second item
** Sub item
*** Sub sub item
* Third item
----
**test list 2**
# Numbered list
# Second item
## Sub item
## Another sub item
```

```
# Third item
;
@endmindmap
```



[Ref. QA-17838]

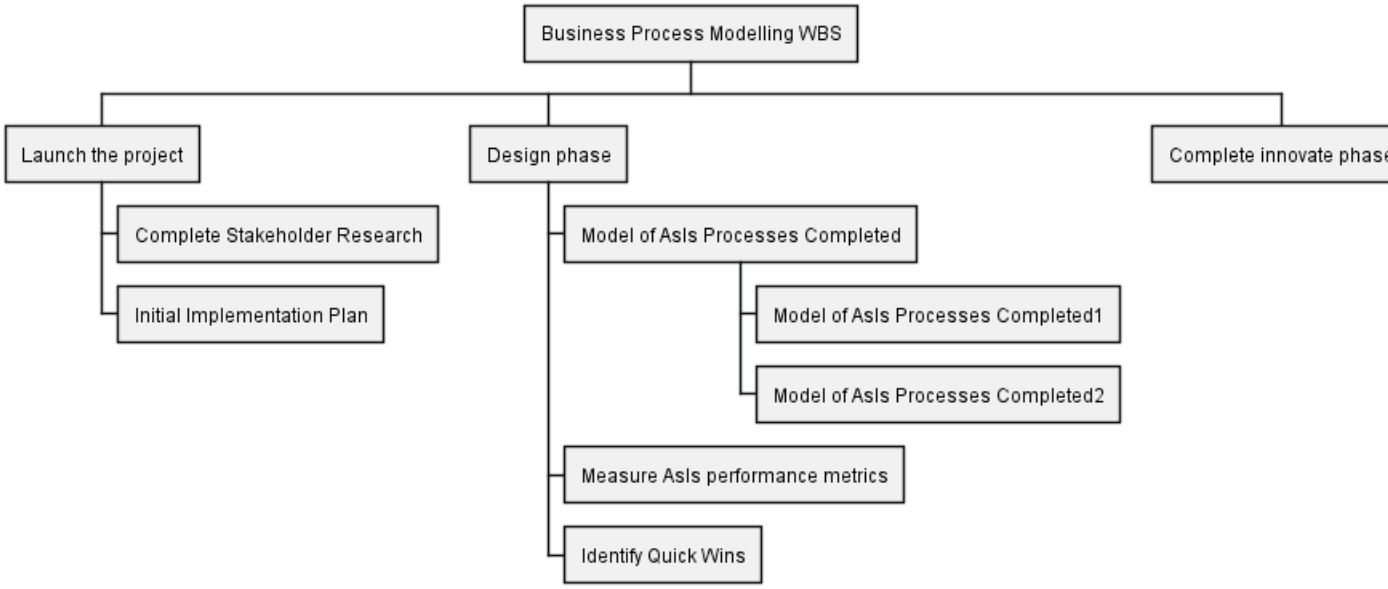
18 Work Breakdown Structure (WBS)

WBS diagram are still in beta: the syntax may change without notice.

18.1 OrgMode syntax

This syntax is compatible with OrgMode

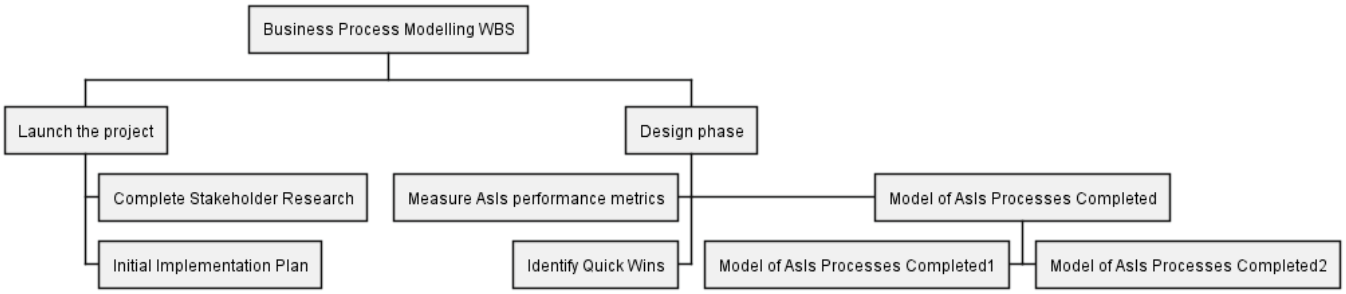
```
@startwbs
* Business Process Modelling WBS
** Launch the project
*** Complete Stakeholder Research
*** Initial Implementation Plan
** Design phase
*** Model of AsIs Processes Completed
**** Model of AsIs Processes Completed1
**** Model of AsIs Processes Completed2
*** Measure AsIs performance metrics
*** Identify Quick Wins
** Complete innovate phase
@endwbs
```



18.2 Change direction

You can change direction using < and >

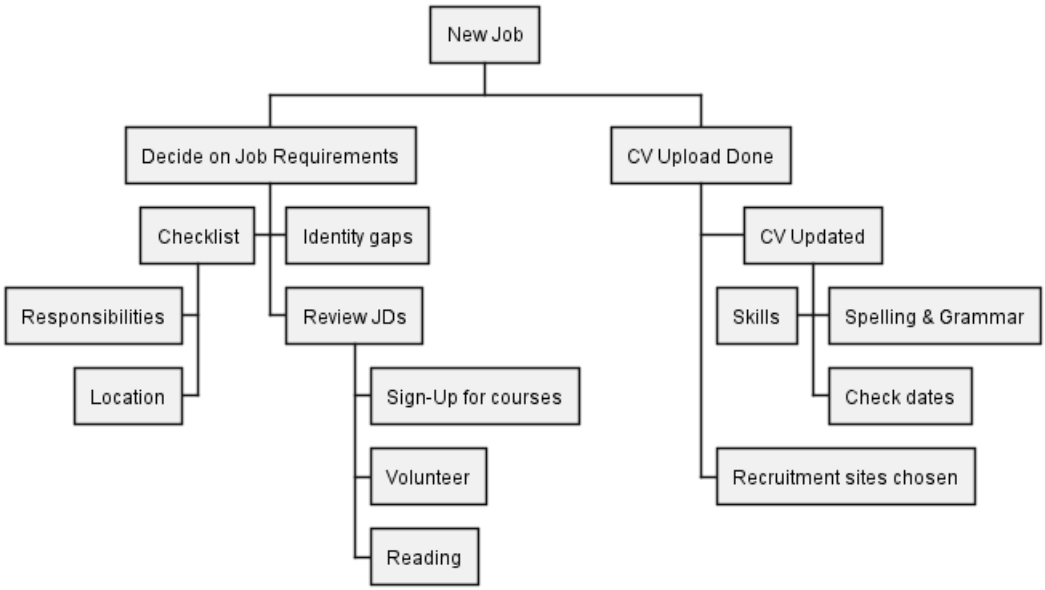
```
@startwbs
* Business Process Modelling WBS
** Launch the project
*** Complete Stakeholder Research
*** Initial Implementation Plan
** Design phase
*** Model of AsIs Processes Completed
****< Model of AsIs Processes Completed1
****> Model of AsIs Processes Completed2
***< Measure AsIs performance metrics
***< Identify Quick Wins
@endwbs
```



18.3 Arithmetic notation

You can use the following notation to choose diagram side.

```
@startwbs
+ New Job
++ Decide on Job Requirements
+++ Identity gaps
+++ Review JDs
++++ Sign-Up for courses
++++ Volunteer
++++ Reading
++- Checklist
+++- Responsibilities
+++- Location
++ CV Upload Done
+++ CV Updated
++++ Spelling & Grammar
++++ Check dates
---- Skills
+++ Recruitment sites chosen
@endwbs
```

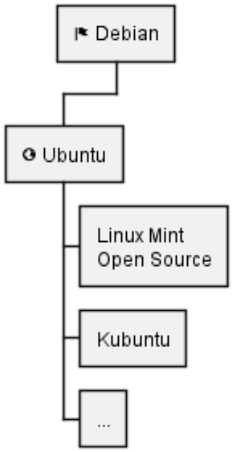


18.4 Multilines

You can use : and ; to have multilines box, as on MindMap.

```
@startwbs
```

```
* <&flag> Debian
** <&globe> Ubuntu

***:Linux Mint
Open Source;

*** Kubuntu
*** ...
@endwbs
```



[Ref. QA-13945]

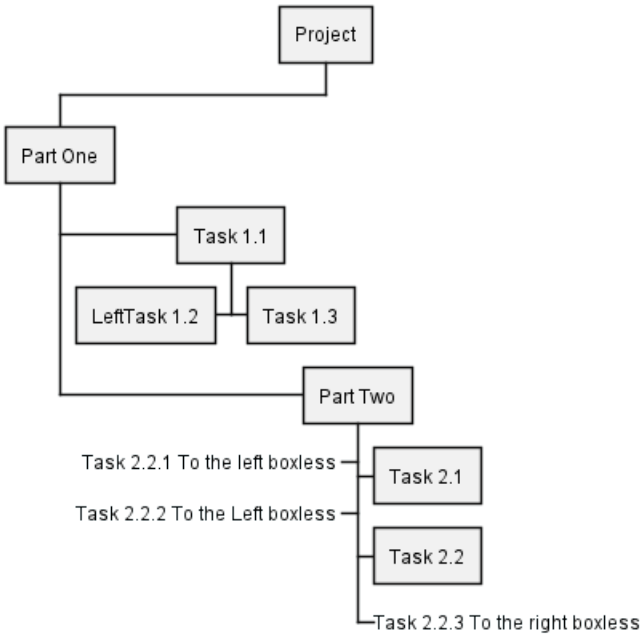
18.5 Removing box

You can use underscore _ to remove box drawing.

18.5.1 Boxless on Arithmetic notation

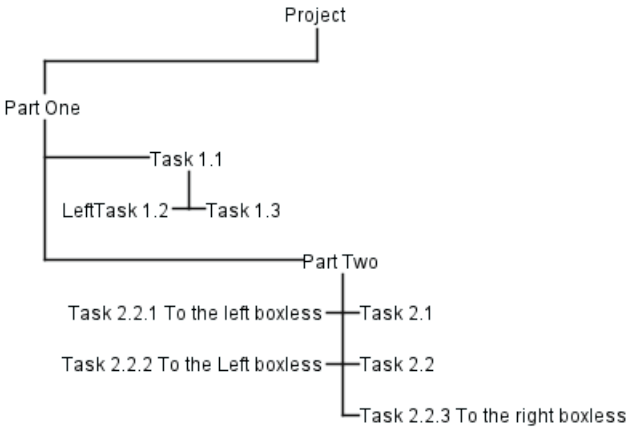
18.5.2 Several boxless node

```
@startwbs
+ Project
 + Part One
  + Task 1.1
   - LeftTask 1.2
   + Task 1.3
  + Part Two
   + Task 2.1
   + Task 2.2
   -_ Task 2.2.1 To the left boxless
   -_ Task 2.2.2 To the Left boxless
   +_ Task 2.2.3 To the right boxless
@endwbs
```



18.5.3 All boxless node

```
@startwbs
+_ Project
 +_ Part One
  +_ Task 1.1
   -_ LeftTask 1.2
   +_ Task 1.3
  +_ Part Two
   +_ Task 2.1
   +_ Task 2.2
   -_ Task 2.2.1 To the left boxless
   -_ Task 2.2.2 To the Left boxless
   +_ Task 2.2.3 To the right boxless
@endwbs
```

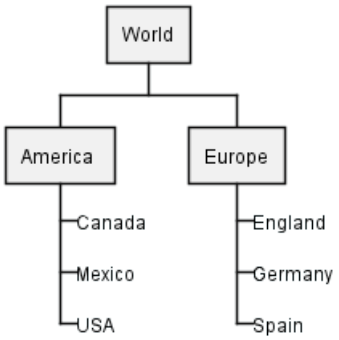


18.5.4 Boxless on OrgMode syntax

18.5.5 Several boxless node

```
@startwbs
* World
** America
```

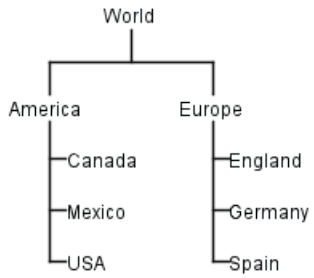
```
***_ Canada
***_ Mexico
***_ USA
** Europe
***_  England
***_  Germany
***_  Spain
@endwbs
```



[Ref. QA-13297]

18.5.6 All boxless node

```
@startwbs
*_ World
**_ America
***_ Canada
***_ Mexico
***_ USA
**_ Europe
***_  England
***_  Germany
***_  Spain
@endwbs
```



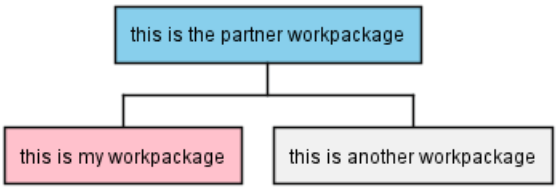
[Ref. QA-13355]

18.6 Colors (with inline or style color)

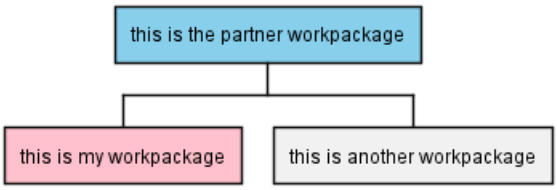
It is possible to change node color:

- with inline color

```
@startwbs
*[#SkyBlue] this is the partner workpackage
**[#pink] this is my workpackage
** this is another workpackage
@endwbs
```



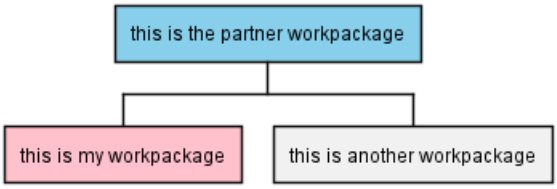

```
@startwbs
+[#SkyBlue] this is the partner workpackage
++[#pink] this is my workpackage
++ this is another workpackage
@endwbs
```



[Ref. QA-12374, only from v1.2020.20]

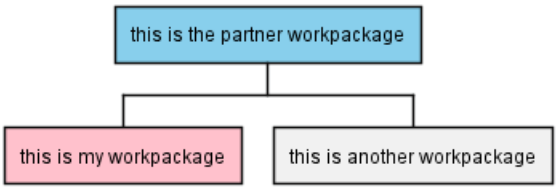
- with style color

```
@startwbs
<style>
wbsDiagram {
  .pink {
      BackgroundColor pink
  }
  .your_style_name {
      BackgroundColor SkyBlue
  }
}
</style>
* this is the partner workpackage <<your_style_name>>
** this is my workpackage <<pink>>
** this is another workpackage
@endwbs
```




```
@startwbs
<style>
wbsDiagram {
  .pink {
      BackgroundColor pink
  }
  .your_style_name {
      BackgroundColor SkyBlue
  }
}
</style>
+ this is the partner workpackage <<your_style_name>>
++ this is my workpackage <<pink>>
```

```
++ this is another workpackage
@endwbs
```

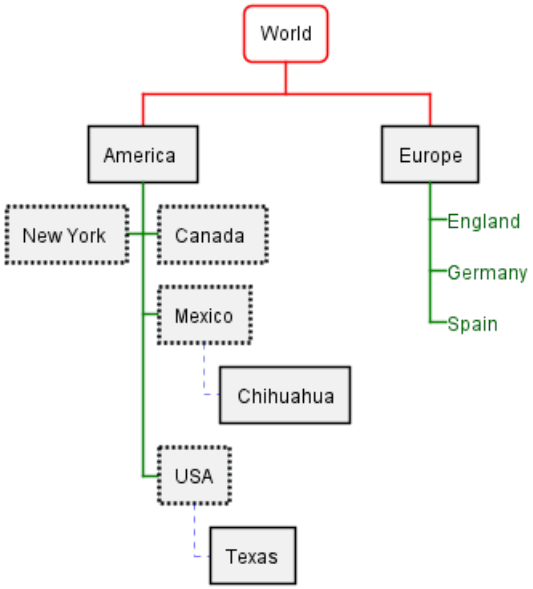


18.7 Using style

It is possible to change diagram style.

```
@startwbs
<style>
wbsDiagram {
  // all lines (meaning connector and borders, there are no other lines in WBS) are black by default
  Linecolor black
  arrow {
    // note that connector are actually "arrow" even if they don't look like as arrow
    // This is to be consistent with other UML diagrams. Not 100% sure that it's a good idea
    // So now connector are green
    LineColor green
  }
  :depth(0) {
      // will target root node
      BackgroundColor White
      RoundCorner 10
      LineColor red
      // Because we are targetting depth(0) for everything, border and connector for level 0 will be
  }
  arrow {
    :depth(2) {
      // Targetting only connector between Mexico-Chihuahua and USA-Texas
      LineColor blue
      LineStyle 4
      LineThickness .5
    }
  }
  node {
    :depth(2) {
      LineStyle 2
      LineThickness 2.5
    }
  }
  boxless {
    // will target boxless node with '_'
    FontColor darkgreen
  }
}
</style>
* World
** America
*** Canada
*** Mexico
**** Chihuahua
*** USA
**** Texas
```

```
***< New York
** Europe
***_  England
***_  Germany
***_  Spain
@endwbs
```

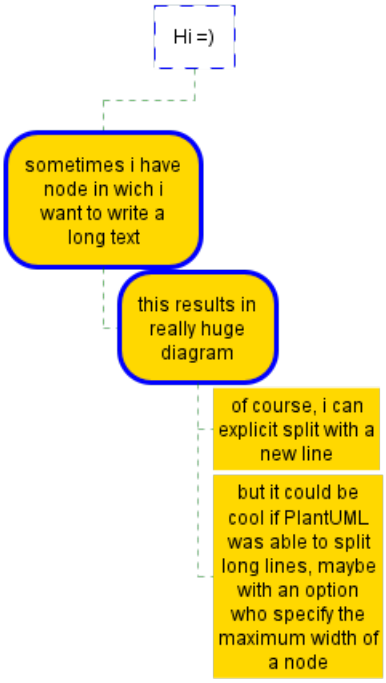


18.8 Word Wrap

Using `MaximumWidth` setting you can control automatic word wrap. Unit used is pixel.

```
@startwbs


<style>
node {
    Padding 12
    Margin 3
    HorizontalAlignment center
    LineColor blue
    LineThickness 3.0
    BackgroundColor gold
    RoundCorner 40
    MaximumWidth 100
}

rootNode {
    LineStyle 8.0;3.0
    LineColor red
    BackgroundColor white
    LineThickness 1.0
    RoundCorner 0
    Shadowing 0.0
}

leafNode {
    LineColor gold
    RoundCorner 0
    Padding 3
```

```
}

arrow {
    LineStyle 4
    LineThickness 0.5
    LineColor green
}
</style>

* Hi =)
** sometimes i have node in wich i want to write a long text
*** this results in really huge diagram
**** of course, i can explicit split with a\nnew line
**** but it could be cool if PlantUML was able to split long lines, maybe with an option who specify

@endwbs
```

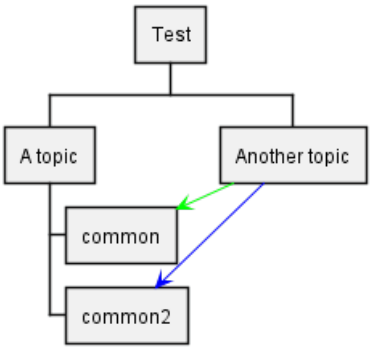


18.9 Add arrows between WBS elements

You can add arrows between WBS elements.

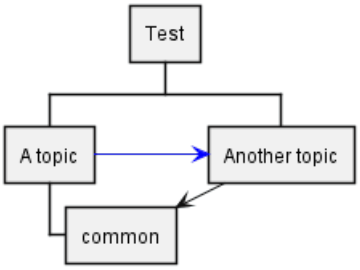
Using alias with `as`:

```
@startwbs
<style>
.foo {
  LineColor #00FF00;
}
</style>
* Test
** A topic
*** "common" as c1
*** "common2" as c2
** "Another topic" as t2
t2 -> c1 <<foo>>
t2 ..> c2 #blue
@endwbs
```



Using alias in parentheses:

```
@startwbs
* Test
**(b) A topic
***(c1) common
**(t2) Another topic
t2 --> c1
b -> t2 #blue
@endwbs
```



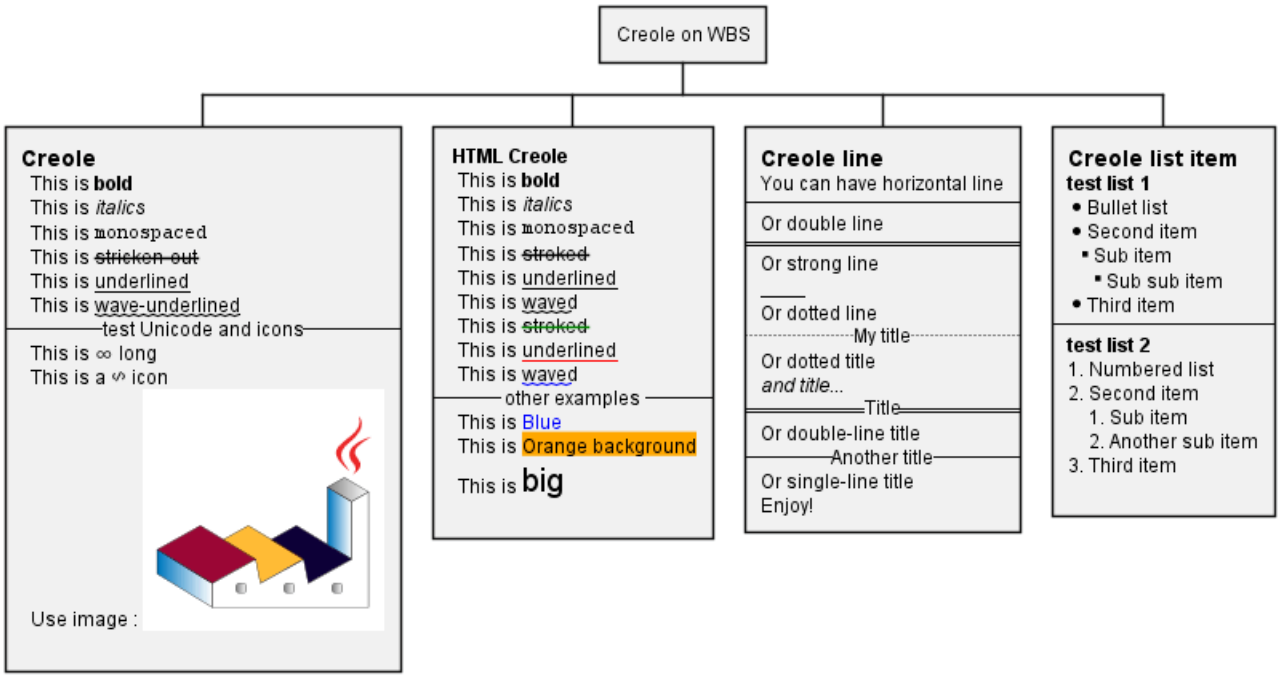
[Ref. QA-16251]

18.10 Creole on WBS diagram

You can use Creole or HTML Creole on WBS:

```
@startwbs
* Creole on WBS
**:==Creole
  This is **bold**
  This is //italics//
  This is ""monospaced""
  This is --stricken-out--
  This is __underlined__
  This is ~~wave-underlined~~
--test Unicode and icons--
  This is <U+221E> long
  This is a <&code> icon
  Use image : <img:http://plantuml.com/logo3.png>
;
**: <b>HTML Creole
  This is <b>bold</b>
  This is <i>italics</i>
  This is <font:monospaced>monospaced</font>
  This is <s>stroked</s>
  This is <u>underlined</u>
  This is <w>waved</w>
```

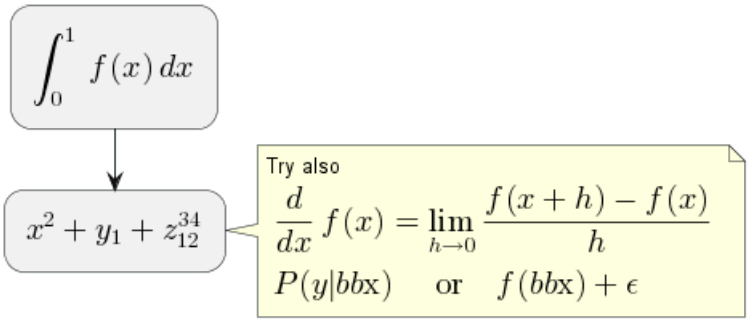
```
  This is <s:green>stroked</s>
  This is <u:red>underlined</u>
  This is <w:#0000FF>waved</w>
-- other examples --
  This is <color:blue>Blue</color>
  This is <back:orange>Orange background</back>
  This is <size:20>big</size>
;
**:==Creole line
You can have horizontal line
----
Or double line
====
Or strong line
____
Or dotted line
..My title..
Or dotted title
//and title... //
==Title==
Or double-line title
--Another title--
Or single-line title
Enjoy!;
**:==Creole list item
**test list 1**
* Bullet list
* Second item
** Sub item
*** Sub sub item
* Third item
----
**test list 2**
# Numbered list
# Second item
## Sub item
## Another sub item
# Third item
;
@endwbs
```


Creole on WBS
Creole
This is bold
This is italics
This is monospaced
This is stricken-out
This is underlined
This is wave-underlined
test Unicode and icons
This is ∞ long
This is a ↫ icon
Use image :
HTML Creole
This is bold
This is italics
This is monospaced
This is stroked
This is underlined
This is waved
This is stroked
This is underlined
This is waved
other examples
This is Blue
This is Orange background
This is big
Creole line
You can have horizontal line
Or double line
Or strong line
Or dotted line
My title
Or dotted title
and title...
Title
Or double-line title
Another title
Or single-line title
Enjoy!
Creole list item
test list 1
Bullet list
Second item
Sub item
Sub sub item
Third item
test list 2
1. Numbered list
2. Second item
1. Sub item
2. Another sub item
3. Third item

19 Maths

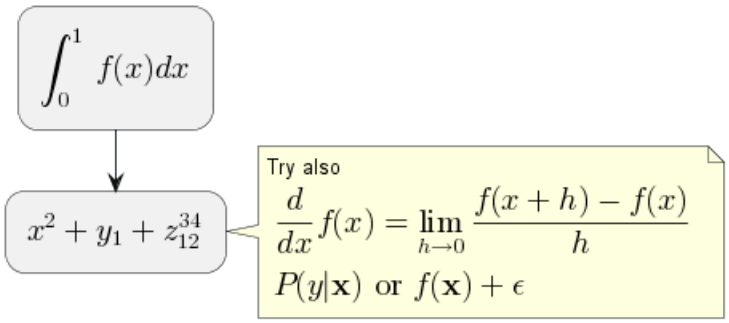
Within PlantUML, you can use AsciiMath notation:

```
@startuml
:<math>int_0^1f(x)dx</math>;
:<math>x^2+y_1+z_12^34</math>;
note right
Try also
<math>d/dxf(x)=lim_(h->0)(f(x+h)-f(x))/h</math>
<math>P(y|bb"x") or f(bb"x")+epsilon</math>
end note
@enduml
```



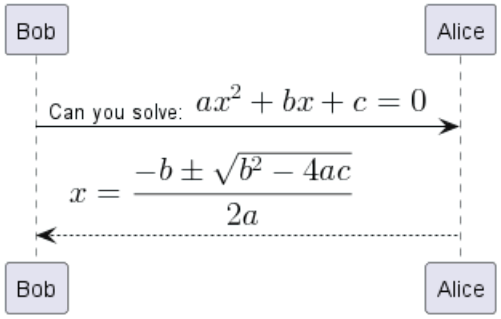
or JLaTeXMath notation:

```
@startuml
:<latex>\int_0^1f(x)dx</latex>;
:<latex>x^2+y_1+z_{12}^{34}</latex>;
note right
Try also
<latex>\dfrac{d}{dx}f(x)=\lim\limits_{h \to 0}\dfrac{f(x+h)-f(x)}{h}</latex>
<latex>P(y|\mathbf{x}) \mbox{ or } f(\mathbf{x})+\epsilon</latex>
end note
@enduml
```



Here is another example:

```
@startuml
Bob -> Alice : Can you solve: <math>ax^2+bx+c=0</math>
Alice --> Bob: <math>x = (-b+-sqrt(b^2-4ac))/(2a)</math>
@enduml
```



19.1 Standalone diagram

You can also use `@startmath`/`@endmath` to create standalone AsciiMath formula.

```
@startmath
f(t)=(a_0)/2 + sum_(n=1)^ooa_ncos((npit)/L)+sum_(n=1)^oo b_n\ sin((npit)/L)
@endmath
```

$$f(t) = \frac{a_0}{2} + \sum_{n=1}^{\infty} a_n \cos\left(\frac{n\pi t}{L}\right) + \sum_{n=1}^{\infty} b_n \ \sin\left(\frac{n\pi t}{L}\right)$$

Or use `@startlatex`/`@endlatex` to create standalone JLaTeXMath formula.

```
@startlatex
\sum_{i=0}^{n-1} (a_i + b_i^2)
@endlatex
```

$$\sum_{i=0}^{n-1} (a_i + b_i^2)$$

19.2 How is this working?

To draw those formulas, PlantUML uses two open source projects:

- AsciiMath that converts AsciiMath notation to LaTeX expression;
- JLatexMath that displays mathematical formulas written in LaTeX. JLaTeXMath is the best Java library to display LaTeX code.

ASCIIMathTeXImg.js is small enough to be integrated into PlantUML standard distribution.

Since JLatexMath is bigger, you have to download it separately, then unzip the 4 jar files (*batik-all-1.7.jar*, *jlatexmath-minimal-1.0.3.jar*, *jlm_cyrillic.jar* and *jlm_greek.jar*) in the same folder as PlantUML.jar.

20 Entity-Relationship-Diagramm

Basierend auf der Information-Engineering-Notation, auch Krähenfußnotation genannt.

Dies ist eine Erweiterung des Klassen Diagramms. Dieses wird erweitert um:

- weitere Beziehungen für die Information-Engineering-Notation,
- ein `entity` Alias, dass auf das Klassendiagramm `class` abbildet,
- und `*` als zusätzlicher Sichtbarkeitsmodifikator zur Kennzeichnung vorgeschriebener Attribute.

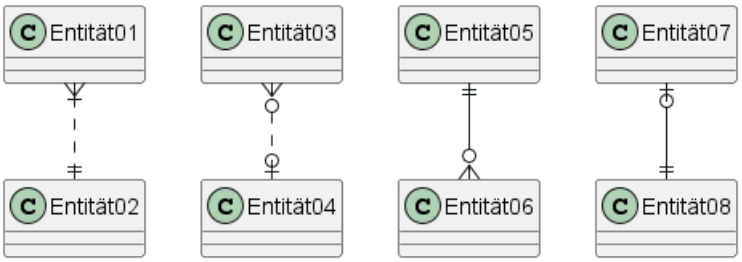
Ansonsten ist die Syntax für das Zeichnen von Diagrammen die gleiche wie für Klassendiagramme. Alle anderen Funktionen von Klassendiagrammen werden ebenfalls unterstützt.

20.1 Information-Engineering-Beziehungen

Art	Symbol
Eine oder Keine	`|o--`
Exakt Eine	`||--`
Keine oder Viele	`}o--`
Eine oder Viele	`}|--`

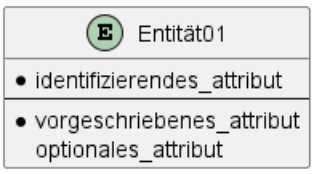
Beispiele:

```
@startuml
Entität01 }|..|| Entität02
Entität03 }o..o| Entität04
Entität05 ||--o{ Entität06
Entität07 |o--|| Entität08
@enduml
```



20.2 Entitäten

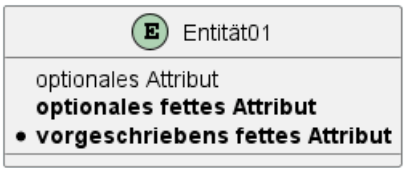
```
@startuml
entity Entität01 {
  * identifizierendes_attribut
  --
  * vorgeschriebenes_attribut
  optionales_attribut
}
@enduml
```



Auch hier handelt es sich um die normale Klassendiagrammsyntax (abgesehen von der Verwendung von `entity` anstelle von `class`). Alles, was Sie in einem Klassendiagramm tun können, können Sie auch hier tun.

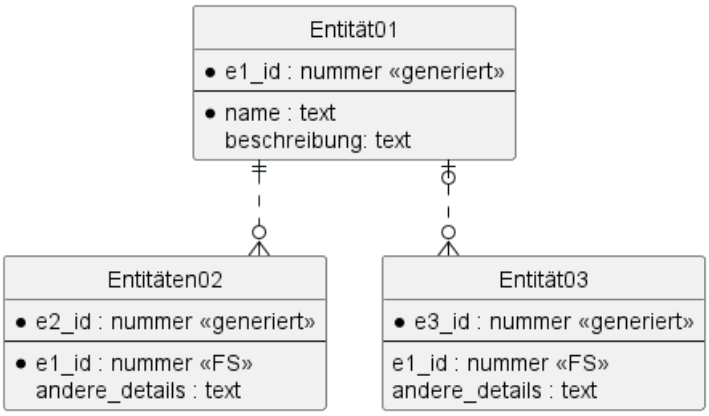
Der Sichtbarkeitsmodifikator * kann verwendet werden, um vorgeschriebene Attribute zu kennzeichnen. Nach dem Modifizierungszeichen kann ein Leerzeichen verwendet werden, um Konflikte mit der Creole-Syntax für Fettdruck zu vermeiden:

```
@startuml
entity Entität01 {
   optionales Attribut
   **optionales fettes Attribut**
   * **vorgeschriebens fettes Attribut**
}
@enduml
```



20.3 Komplettes Beispiel

```
@startuml

' verstecke das E im Entitäten-Titel
hide circle

' verhindere Probleme mit gewinkelten Krähenfüßen
skinparam linetype ortho

entity "Entität01" as e01 {
  *e1_id : nummer <<generiert>>
  --
  *name : text
  beschreibung: text
}

entity "Entitäten02" as e02 {
  *e2_id : nummer <<generiert>>
  --
  *e1_id : nummer <<FS>>
  andere_details : text
}

entity "Entität03" as e03 {
  *e3_id : nummer <<generiert>>
  --
  e1_id : nummer <<FS>>
  andere_details : text
}

e01 ||..o{ e02
e01 |o..o{ e03

@enduml
```



Derzeit sehen die Krähenfüße nicht sehr gut aus, wenn die Beziehung in einem Winkel zum Objekt gezeichnet wird. Dies kann durch die Verwendung des `linetype ortho` skinparam vermieden werden.

21 Allgemeine Befehle in PlantUML

Entdecken Sie die grundlegenden Befehle, die universell für alle Diagrammtypen in PlantUML gelten. Mit diesen Befehlen können Sie Ihren Diagrammen Vielseitigkeit und individuelle Details verleihen. Im Folgenden unterteilen wir diese allgemeinen Befehle in drei Hauptkategorien:

21.0.1 Globale Elemente

- **Kommentare:** Fügen Sie in Ihr Diagrammskript Anmerkungen oder Erklärungen ein, um zusätzliche Informationen zu übermitteln oder um Hinweise für weitere Änderungen zu hinterlassen.
- **Notizen:** Fügen Sie zusätzliche Informationen direkt in Ihr Diagramm ein, um das Verständnis zu erleichtern oder wichtige Aspekte hervorzuheben.
- **Größenkontrolle:** Passen Sie die Dimensionen der verschiedenen Elemente Ihren Wünschen an und sorgen Sie so für ein ausgewogenes und wohlproportioniertes Diagramm.
- **Titel und Beschriftungen:** Definieren Sie einen passenden Titel und fügen Sie Beschriftungen hinzu, um den Kontext zu verdeutlichen oder bestimmte Teile Ihres Diagramms zu kommentieren.

21.0.2 Beschreibung der kreolischen Syntax

Nutzen Sie die Möglichkeiten der kreolischen Syntax, um den Inhalt eines beliebigen Elements in Ihrem Diagramm weiter zu formatieren. Dieser Wiki-Auszeichnungsstil ermöglicht Folgendes:

- **Textformatierung:** Passen Sie das Aussehen Ihres Textes mit verschiedenen Stilen und Ausrichtungen an.
- **Listen:** Erstellen Sie geordnete oder ungeordnete Listen zur übersichtlichen Darstellung von Informationen.
- **Links:** Integrieren Sie Hyperlinks, um die schnelle Navigation zu relevanten Ressourcen zu erleichtern.

21.0.3 Befehl zur Stilsteuerung

Mit dem Befehl `style` haben Sie die vollständige Kontrolle über den Präsentationsstil Ihrer Diagrammelemente. Nutzen Sie diesen Befehl, um:

- **Stile zu definieren:** Legen Sie einheitliche Stile für Elemente fest, um ein kohärentes visuelles Thema zu erhalten.
- **Farben anpassen:** Wählen Sie bestimmte Farben für verschiedene Elemente, um die visuelle Attraktivität zu erhöhen und eindeutige Klassifizierungen zu erstellen.

Nutzen Sie diese Befehle, um Diagramme zu erstellen, die sowohl funktional als auch ästhetisch ansprechend sind, und passen Sie jedes Element genau an Ihre Vorgaben an.

21.1 Comments

21.1.1 Simple comment

Everything that starts with `simple quote '` is a comment.

```
@startuml
'Line comments use a single apostrophe
@enduml
```

21.1.2 Block comment

Block comment use C-style comments except that instead of `*` you use an apostrophe `'`, then you can also put comments on several lines using `/'` to start and `'/` to end.

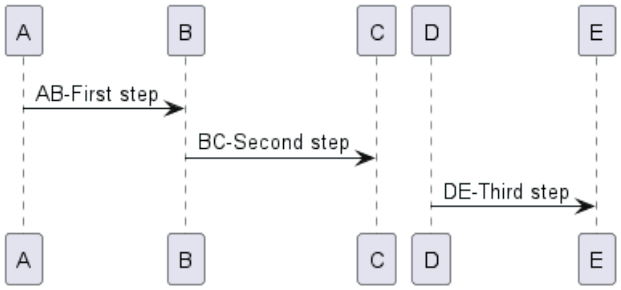
```
@startuml
/'
many lines comments
```

```
here
'/
@enduml
```

[Ref. QA-1353]

Then you can also put block comment on the same line, as:

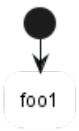
```
@startuml
/' case 1 '/   A -> B : AB-First step
               B -> C : BC-Second step
/' case 2 '/   D -> E : DE-Third step
@enduml
```



[Ref. QA-3906 and QA-3910]

21.1.3 Full example

```
@startuml
skinparam activity {
    ' this is a comment
    BackgroundColor White
    BorderColor Black /' this is a comment '/
    BorderColor Red  ' this is not a comment and this line is ignored
}

start
:foo1;
@enduml
```



[Ref. GH-214]

21.2 Zoom

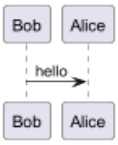
You can use the `scale` command to zoom the generated image.

You can use either *a number* or *a fraction* to define the scale factor. You can also specify either `width` or `height` (*in pixel*). And you can also give both `width` and `height`: the image is scaled to fit inside the specified dimension.

- `scale 1.5`
- `scale 2/3`
- `scale 200 width`
- `scale 200 height`
- `scale 200*100`

- `scale max 300*200`
- `scale max 1024 width`
- `scale max 800 height`

```
@startuml
scale 180*90
Bob->Alice : hello
@enduml
```

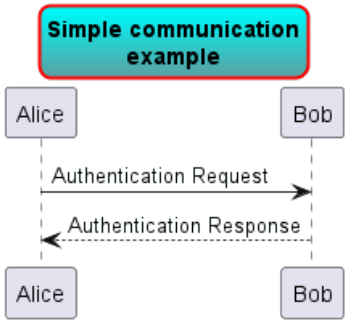


21.3 Title

The `title` keywords is used to put a title. You can add newline using in the title description.

Some skinparam settings are available to put borders on the title.

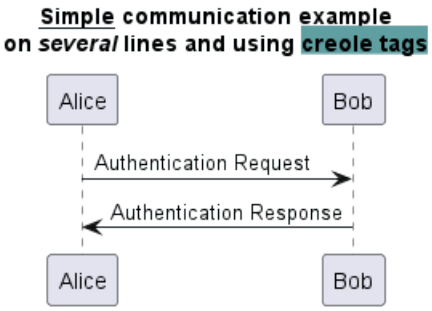
```
@startuml
skinparam titleBorderRoundCorner 15
skinparam titleBorderThickness 2
skinparam titleBorderColor red
skinparam titleBackgroundColor Aqua-CadetBlue

title Simple communication\nexample

Alice -> Bob: Authentication Request
Bob --> Alice: Authentication Response

@enduml
```



You can use creole formatting in the title.

You can also define title on several lines using `title` and `end title` keywords.

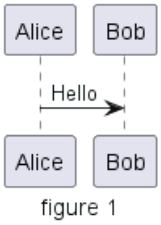
```
@startuml

title
 <u>Simple</u> communication example
 on <i>several</i> lines and using <back:cadetblue>creole tags</back>
end title

Alice -> Bob: Authentication Request
Bob -> Alice: Authentication Response

@enduml
```



21.4 Caption

There is also a `caption` keyword to put a caption under the diagram.

```
@startuml

caption figure 1
Alice -> Bob: Hello

@enduml
```



21.5 Footer and header

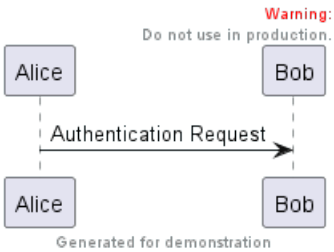
You can use the commands `header` or `footer` to add a footer or a header on any generated diagram.

You can optionally specify if you want a `center`, `left` or `right` footer/header, by adding a keyword.

As with title, it is possible to define a header or a footer on several lines.

It is also possible to put some HTML into the header or footer.

```
@startuml
Alice -> Bob: Authentication Request

header
<font color=red>Warning:</font>
Do not use in production.
endheader

center footer Generated for demonstration

@enduml
```

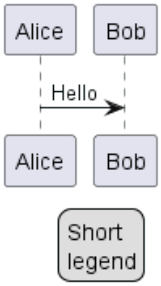


21.6 Legend the diagram

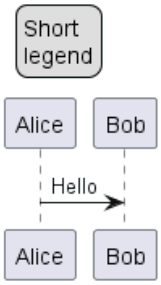
The `legend` and `end legend` are keywords is used to put a legend.

You can optionally specify to have `left`, `right`, `top`, `bottom` or `center` alignment for the legend.

```
@startuml
Alice -> Bob : Hello
legend right
  Short
  legend
endlegend
@enduml
```




```
@startuml
Alice -> Bob : Hello
legend top left
  Short
  legend
endlegend
@enduml
```

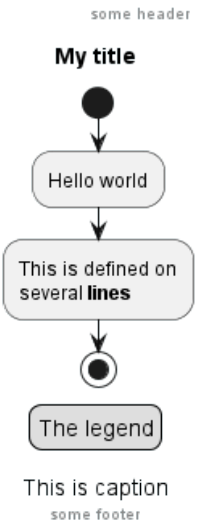


21.7 Appendix: Examples on all diagram

21.7.1 Activity

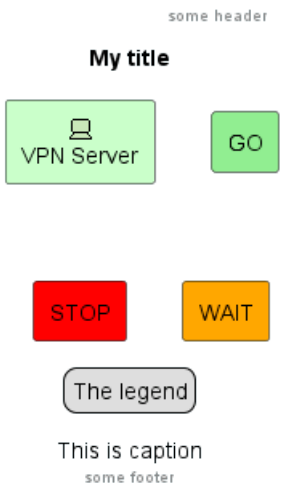
```
@startuml
header some header

footer some footer

title My title

caption This is caption

legend
The legend
end legend

start
```

```
:Hello world;
:This is defined on
several **lines**;
stop

@enduml
```



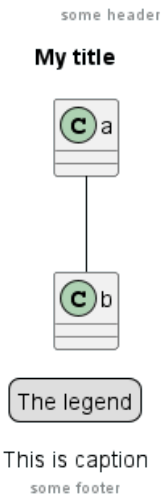
21.7.2 Archimate

```
@startuml
header some header

footer some footer

title My title

caption This is caption

legend
The legend
end legend

archimate #Technology "VPN Server" as vpnServerA <<technology-device>>

rectangle GO #lightgreen
rectangle STOP #red
rectangle WAIT #orange

@enduml
```



21.7.3 Class

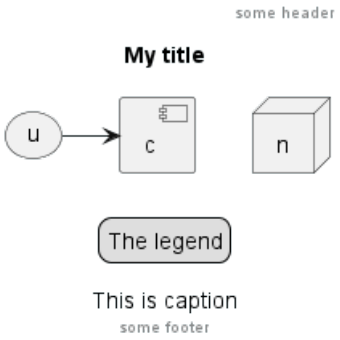
```
@startuml
header some header

footer some footer

title My title

caption This is caption

legend
The legend
end legend

a -- b

@enduml
```



21.7.4 Component, Deployment, Use-Case

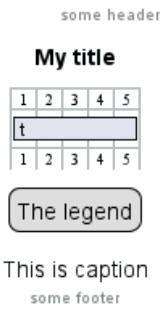
```
@startuml
header some header

footer some footer
```

```
title My title

caption This is caption

legend
The legend
end legend

node n
(u) -> [c]

@enduml
```



21.7.5 Gantt project planning

```
@startgantt
header some header

footer some footer

title My title

caption This is caption

legend
The legend
end legend


[t] lasts 5 days

@endgantt
```

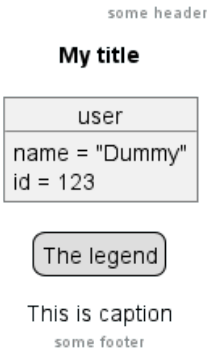


TODO: DONE *[(Header, footer) corrected on V1.2020.18]*

21.7.6 Object

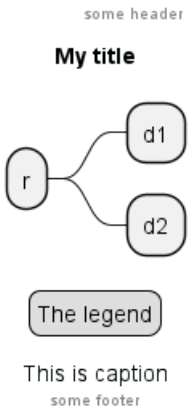
```
@startuml
```

```
header some header

footer some footer

title My title

caption This is caption

legend
The legend
end legend

object user {
  name = "Dummy"
  id = 123
}

@enduml
```



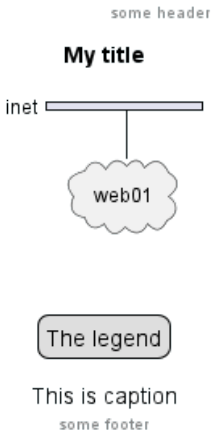
21.7.7 MindMap

```
@startmindmap
header some header

footer some footer

title My title

caption This is caption

legend
The legend
end legend

* r
** d1
** d2

@endmindmap
```



21.7.8 Network (nwdiag)

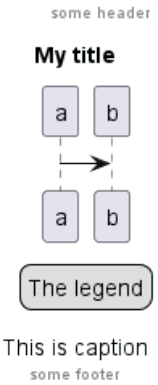
```
@startuml
header some header

footer some footer

title My title

caption This is caption

legend
The legend
end legend

nwdiag {
  network inet {
      web01 [shape = cloud]
  }
}

@enduml
```



21.7.9 Sequence

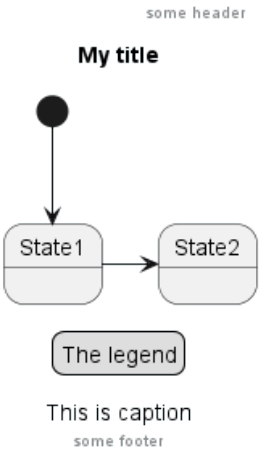
```
@startuml
header some header

footer some footer
```

```
title My title

caption This is caption

legend
The legend
end legend

a->b
@enduml
```



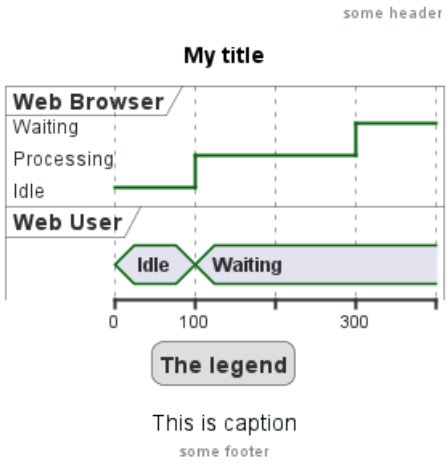
21.7.10 State

```
@startuml
header some header

footer some footer

title My title

caption This is caption

legend
The legend
end legend

[*] --> State1
State1 -> State2

@enduml
```



21.7.11 Timing

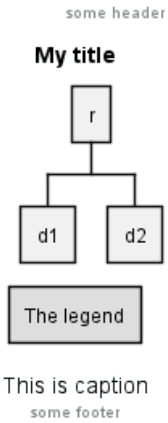
```
@startuml
header some header

footer some footer

title My title

caption This is caption

legend
The legend
end legend

robust "Web Browser" as WB
concise "Web User" as WU

@0
WU is Idle
WB is Idle

@100
WU is Waiting
WB is Processing

@300
WB is Waiting

@enduml
```



21.7.12 Work Breakdown Structure (WBS)

```
@startwbs
header some header

footer some footer

title My title

caption This is caption

legend
```

```
The legend
end legend

* r
** d1
** d2

@endwbs
```



TODO: DONE *[Corrected on V1.2020.17]*

21.7.13 Wireframe (SALT)

```
@startsalt
header some header

footer some footer

title My title

caption This is caption

legend
The legend
end legend

{+
  Login    | "MyName   "
  Password | "****     "
  [Cancel] | [  OK   ]
}
@endsalt
```

TODO: DONE *[Corrected on V1.2020.18]*

21.8 Appendix: Examples on all diagram with style

TODO: DONE

FYI:

- all is only good for **`Sequence diagram`**
- `title`, `caption` and `legend` are good for all diagrams except for **`salt diagram`**

TODO: FIXME

- Now *(test on 1.2020.18-19)* `header`, `footer` are not good for **all other diagrams** except only for **`Sequence diagram`**.

To be fix; Thanks

TODO: FIXME

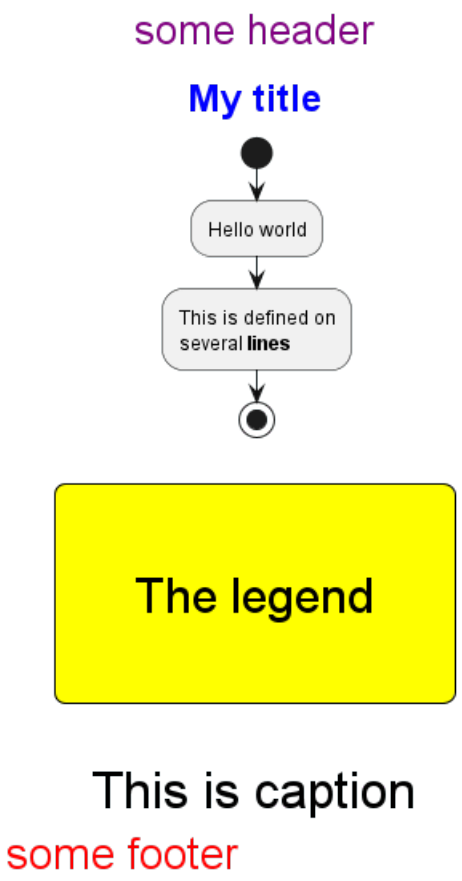
Here are tests of `title`, `header`, `footer`, `caption` or `legend` on all the diagram with the debug style:

```
<style>
title {
  HorizontalAlignment right
  FontSize 24
  FontColor blue
}

header {
  HorizontalAlignment center
  FontSize 26
  FontColor purple
}

footer {
  HorizontalAlignment left
  FontSize 28
  FontColor red
}

legend {
  FontSize 30
  BackGroundColor yellow
  Margin 30
  Padding 50
}

caption {
  FontSize 32
}
</style>
```

21.8.1 Activity

```
@startuml
<style>
title {
  HorizontalAlignment right
  FontSize 24
  FontColor blue
}
```

```
header {
  HorizontalAlignment center
  FontSize 26
  FontColor purple
}

footer {
  HorizontalAlignment left
  FontSize 28
  FontColor red
}

legend {
  FontSize 30
  BackGroundColor yellow
  Margin 30
  Padding 50
}

caption {
  FontSize 32
}
</style>
header some header

footer some footer

title My title

caption This is caption

legend
The legend
end legend

start
:Hello world;
:This is defined on
several **lines**;
stop

@enduml
```



21.8.2 Archimate

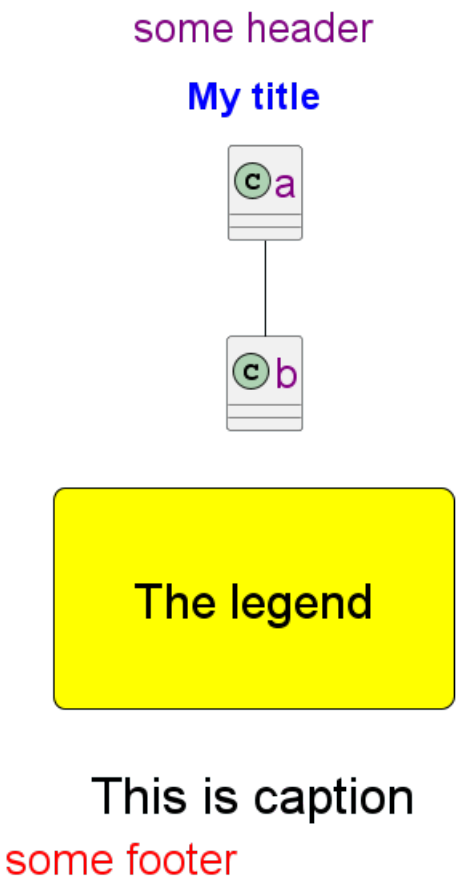
```
@startuml
<style>
title {
  HorizontalAlignment right
  FontSize 24
  FontColor blue
}

header {
  HorizontalAlignment center
  FontSize 26
  FontColor purple
}

footer {
  HorizontalAlignment left
  FontSize 28
  FontColor red
}

legend {
  FontSize 30
  BackGroundColor yellow
  Margin 30
  Padding 50
}
```

```
caption {
  FontSize 32
}
</style>
header some header

footer some footer

title My title

caption This is caption

legend
The legend
end legend

archimate #Technology "VPN Server" as vpnServerA <<technology-device>>

rectangle GO #lightgreen
rectangle STOP #red
rectangle WAIT #orange

@enduml
```

21.8.3 Class

```
@startuml
<style>
title {
  HorizontalAlignment right
  FontSize 24
```

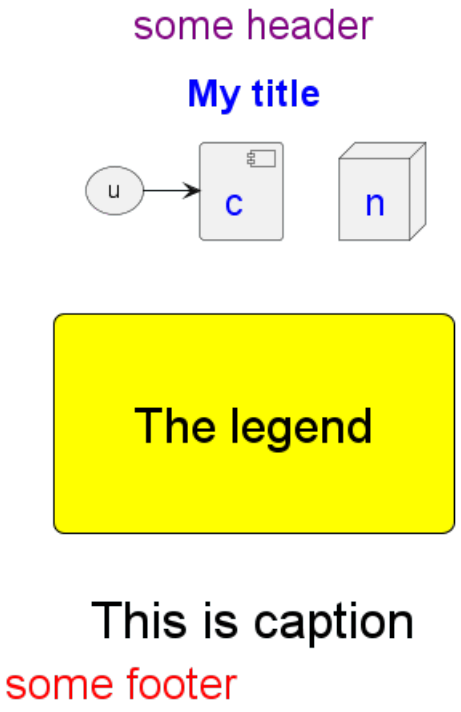
```
  FontColor blue
}

header {
  HorizontalAlignment center
  FontSize 26
  FontColor purple
}

footer {
  HorizontalAlignment left
  FontSize 28
  FontColor red
}

legend {
  FontSize 30
  BackGroundColor yellow
  Margin 30
  Padding 50
}

caption {
  FontSize 32
}
</style>
header some header

footer some footer

title My title

caption This is caption

legend
The legend
end legend

a -- b

@enduml
```



21.8.4 Component, Deployment, Use-Case

```
@startuml
<style>
title {
  HorizontalAlignment right
  FontSize 24
  FontColor blue
}

header {
  HorizontalAlignment center
  FontSize 26
  FontColor purple
}

footer {
  HorizontalAlignment left
  FontSize 28
  FontColor red
}

legend {
  FontSize 30
  BackGroundColor yellow
  Margin 30
  Padding 50
}
```

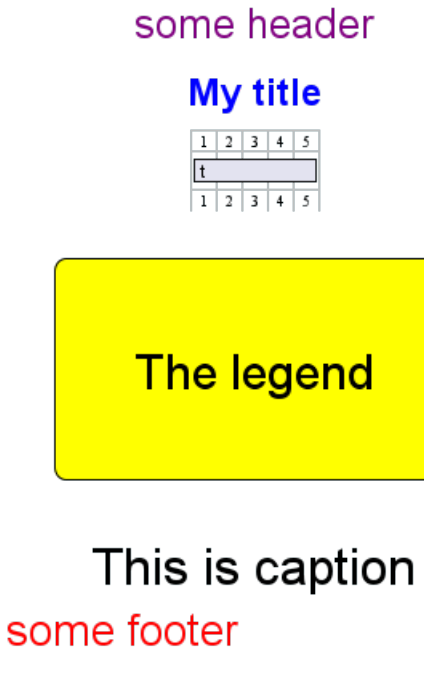
```
caption {
  FontSize 32
}
</style>
header some header

footer some footer

title My title

caption This is caption

legend
The legend
end legend

node n
(u) -> [c]

@enduml
```



21.8.5 Gantt project planning

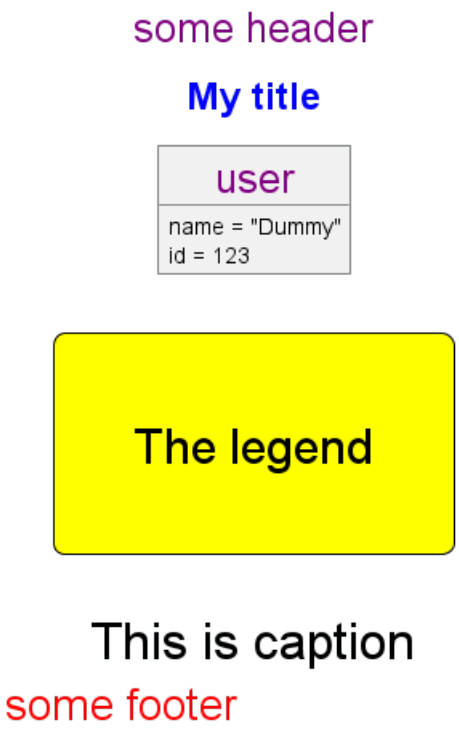
```
@startgantt
<style>
title {
  HorizontalAlignment right
  FontSize 24
  FontColor blue
}

header {
  HorizontalAlignment center
  FontSize 26
  FontColor purple
```

```
}

footer {
  HorizontalAlignment left
  FontSize 28
  FontColor red
}

legend {
  FontSize 30
  BackGroundColor yellow
  Margin 30
  Padding 50
}

caption {
  FontSize 32
}
</style>
header some header

footer some footer

title My title

caption This is caption

legend
The legend
end legend


[t] lasts 5 days

@endgantt
```



21.8.6 Object

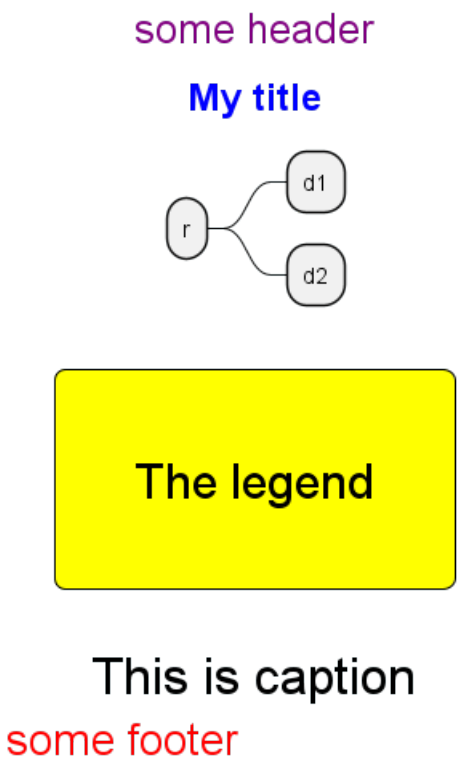
```
@startuml
<style>
title {
  HorizontalAlignment right
  FontSize 24
  FontColor blue
}

header {
  HorizontalAlignment center
  FontSize 26
  FontColor purple
}

footer {
  HorizontalAlignment left
  FontSize 28
  FontColor red
}

legend {
  FontSize 30
  BackGroundColor yellow
  Margin 30
  Padding 50
}

caption {
  FontSize 32
}
</style>
header some header

footer some footer

title My title

caption This is caption

legend
The legend
end legend

object user {
  name = "Dummy"
  id = 123
}

@enduml
```



21.8.7 MindMap

```
@startmindmap
<style>
title {
  HorizontalAlignment right
  FontSize 24
  FontColor blue
}

header {
  HorizontalAlignment center
  FontSize 26
  FontColor purple
}

footer {
  HorizontalAlignment left
  FontSize 28
  FontColor red
}

legend {
  FontSize 30
  BackGroundColor yellow
  Margin 30
  Padding 50
}

caption {
  FontSize 32
}
</style>
header some header
```

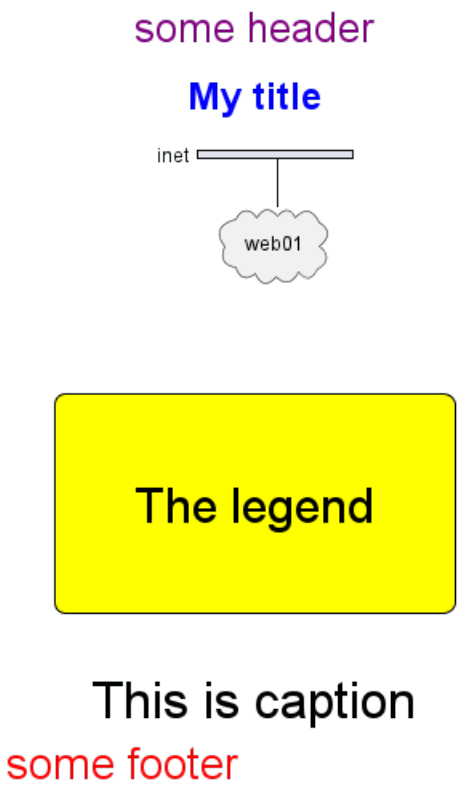
```
footer some footer

title My title

caption This is caption

legend
The legend
end legend

* r
** d1
** d2

@endmindmap
```



21.8.8 Network (nwdiag)

```
@startuml
<style>
title {
  HorizontalAlignment right
  FontSize 24
  FontColor blue
}

header {
  HorizontalAlignment center
  FontSize 26
  FontColor purple
}
```

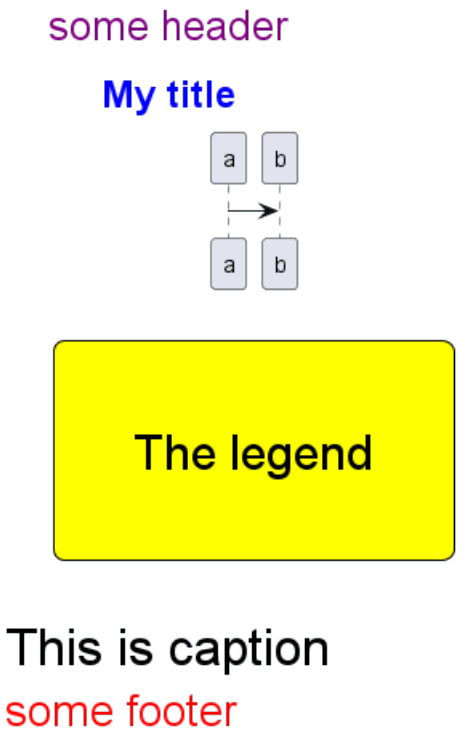
```
footer {
  HorizontalAlignment left
  FontSize 28
  FontColor red
}

legend {
  FontSize 30
  BackGroundColor yellow
  Margin 30
  Padding 50
}

caption {
  FontSize 32
}
</style>
header some header

footer some footer

title My title

caption This is caption

legend
The legend
end legend

nwdiag {
  network inet {
      web01 [shape = cloud]
  }
}

@enduml
```



21.8.9 Sequence

```
@startuml
<style>
title {
  HorizontalAlignment right
  FontSize 24
  FontColor blue
}

header {
  HorizontalAlignment center
  FontSize 26
  FontColor purple
}

footer {
  HorizontalAlignment left
  FontSize 28
  FontColor red
}

legend {
  FontSize 30
  BackGroundColor yellow
  Margin 30
  Padding 50
}

caption {
  FontSize 32
}
</style>
```

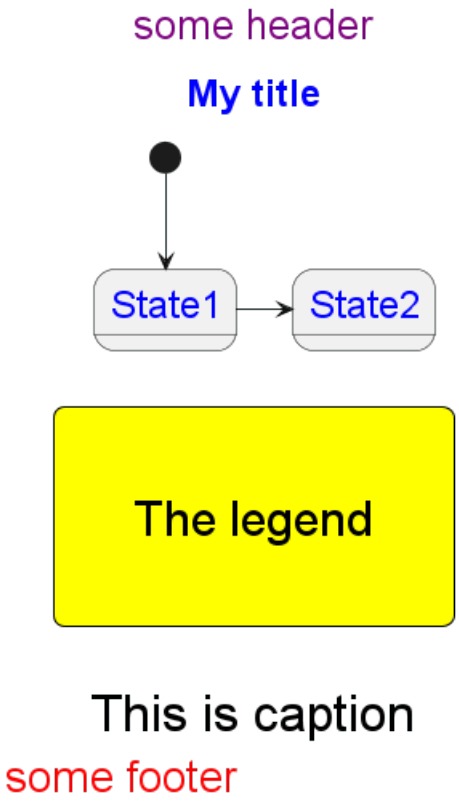
```
header some header

footer some footer

title My title

caption This is caption

legend
The legend
end legend

a->b
@enduml
```



21.8.10 State

```
@startuml
<style>
title {
  HorizontalAlignment right
  FontSize 24
  FontColor blue
}

header {
  HorizontalAlignment center
  FontSize 26
  FontColor purple
}

footer {
  HorizontalAlignment left
  FontSize 28
```

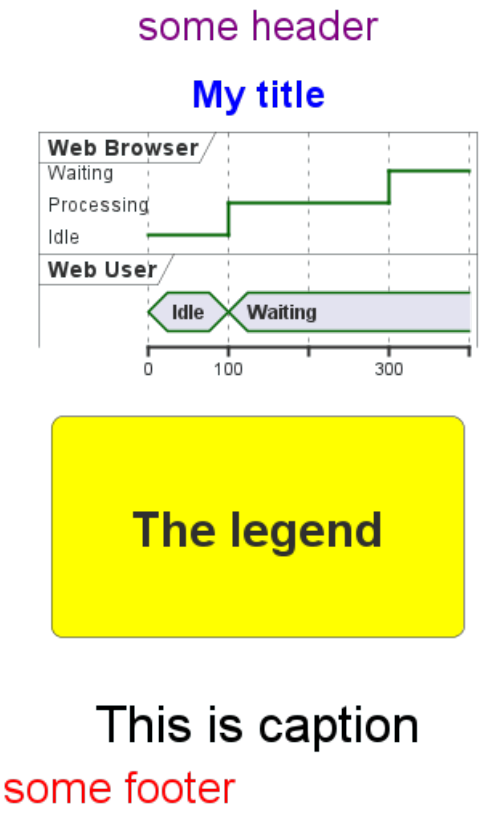
```
  FontColor red
}

legend {
  FontSize 30
  BackGroundColor yellow
  Margin 30
  Padding 50
}

caption {
  FontSize 32
}
</style>
header some header

footer some footer

title My title

caption This is caption

legend
The legend
end legend

[*] --> State1
State1 -> State2

@enduml
```



21.8.11 Timing

```
@startuml
<style>
title {
  HorizontalAlignment right
  FontSize 24
  FontColor blue
}

header {
  HorizontalAlignment center
  FontSize 26
  FontColor purple
}

footer {
  HorizontalAlignment left
  FontSize 28
  FontColor red
}

legend {
  FontSize 30
  BackGroundColor yellow
  Margin 30
  Padding 50
}

caption {
  FontSize 32
}
</style>
header some header

footer some footer

title My title

caption This is caption

legend
The legend
end legend

robust "Web Browser" as WB
concise "Web User" as WU

@0
WU is Idle
WB is Idle

@100
WU is Waiting
WB is Processing

@300
WB is Waiting
```

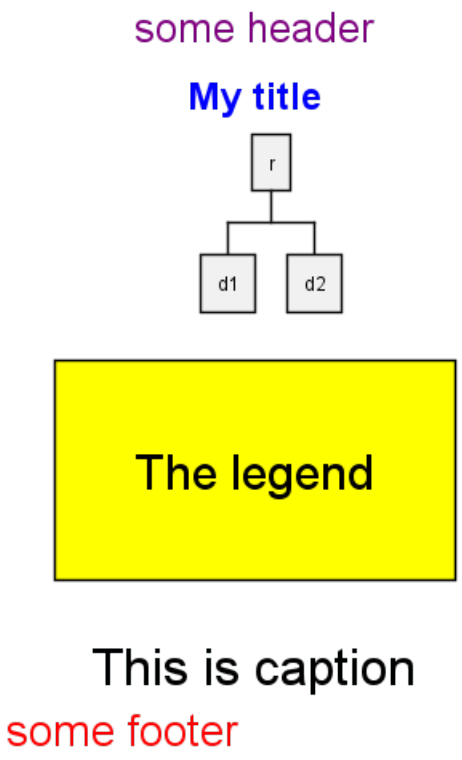
```
@enduml
```



21.8.12 Work Breakdown Structure (WBS)

```
@startwbs
<style>
title {
  HorizontalAlignment right
  FontSize 24
  FontColor blue
}

header {
  HorizontalAlignment center
  FontSize 26
  FontColor purple
}

footer {
  HorizontalAlignment left
  FontSize 28
  FontColor red
}

legend {
  FontSize 30
  BackGroundColor yellow
  Margin 30
  Padding 50
}
```

```
caption {
  FontSize 32
}
</style>
header some header

footer some footer

title My title

caption This is caption

legend
The legend
end legend

* r
** d1
** d2

@endwbs
```



21.8.13 Wireframe (SALT)

TODO: FIXME Fix all (`title`, `caption`, `legend`, `header`, `footer`) for salt. **TODO:** FIXME

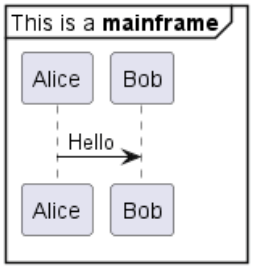
```
@startsalt
<style>
title {
  HorizontalAlignment right
  FontSize 24
  FontColor blue
}
```

```
header {
  HorizontalAlignment center
  FontSize 26
  FontColor purple
}

footer {
  HorizontalAlignment left
  FontSize 28
  FontColor red
}

legend {
  FontSize 30
  BackGroundColor yellow
  Margin 30
  Padding 50
}

caption {
  FontSize 32
}
</style>
@startsalt
header some header

footer some footer

title My title

caption This is caption

legend
The legend
end legend

{+
  Login    | "MyName   "
  Password | "****     "
  [Cancel] | [  OK   ]
}
@endsalt
```

21.9 Mainframe

```
@startuml
mainframe This is a **mainframe**
```

```
Alice->Bob : Hello
@enduml
```

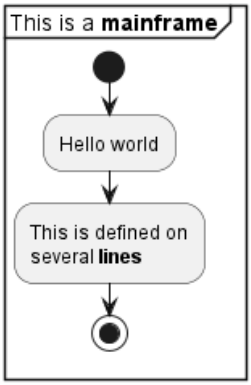


[Ref. QA-4019 and Issue#148]

21.10 Appendix: Examples of Mainframe on all diagram

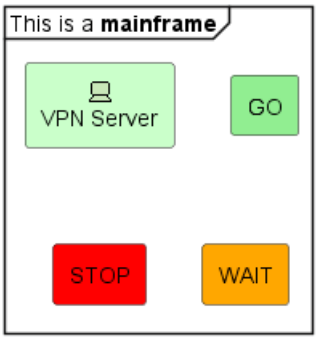
21.10.1 Activity

```
@startuml
mainframe This is a **mainframe**

start
:Hello world;
:This is defined on
several **lines**;
stop
@enduml
```



21.10.2 Archimate

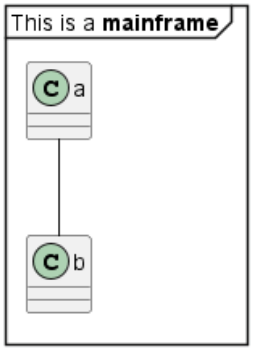
```
@startuml
mainframe This is a **mainframe**

archimate #Technology "VPN Server" as vpnServerA <<technology-device>>
rectangle GO #lightgreen
rectangle STOP #red
rectangle WAIT #orange
@enduml
```



TODO: FIXME Cropped on the top and on the left **TODO:** FIXME

21.10.3 Class

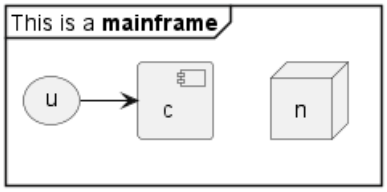
```
@startuml
mainframe This is a **mainframe**

a -- b
@enduml
```



TODO: FIXME Cropped on the top and on the left **TODO:** FIXME

21.10.4 Component, Deployment, Use-Case

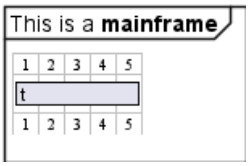
```
@startuml
mainframe This is a **mainframe**

node n
(u) -> [c]
@enduml
```



TODO: FIXME Cropped on the top and on the left **TODO:** FIXME

21.10.5 Gantt project planning

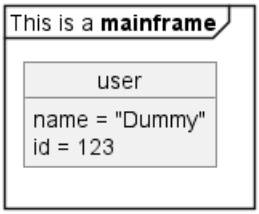
```
@startgantt
mainframe This is a **mainframe**

[t] lasts 5 days
@endgantt
```



TODO: FIXME Cropped on the top and on the left **TODO:** FIXME

21.10.6 Object

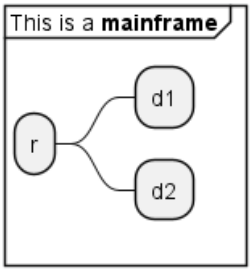
```
@startuml
mainframe This is a **mainframe**

object user {
  name = "Dummy"
  id = 123
}
@enduml
```



TODO: FIXME Cropped on the top! **TODO:** FIXME

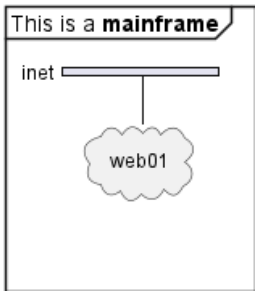
21.10.7 MindMap

```
@startmindmap
mainframe This is a **mainframe**

* r
** d1
** d2
@endmindmap
```



21.10.8 Network (nwdiag)

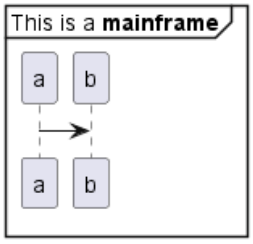
```
@startuml
mainframe This is a **mainframe**

nwdiag {
  network inet {
      web01 [shape = cloud]
  }
}
@enduml
```



TODO: FIXME Cropped on the top! **TODO:** FIXME

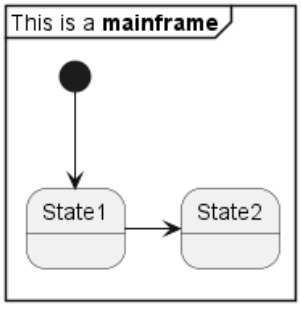
21.10.9 Sequence

```
@startuml
mainframe This is a **mainframe**

a->b
@enduml
```



21.10.10 State

```
@startuml
mainframe This is a **mainframe**

[*] --> State1
State1 -> State2
@enduml
```

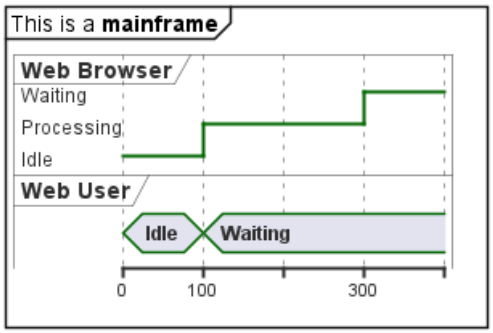


TODO: FIXME Cropped on the top and on the left **TODO:** FIXME

21.10.11 Timing

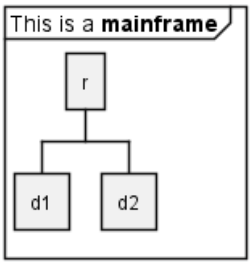
```
@startuml
mainframe This is a **mainframe**

robust "Web Browser" as WB
concise "Web User" as WU
@0
WU is Idle
```

```
WB is Idle
@100
WU is Waiting
WB is Processing
@300
WB is Waiting
@enduml
```



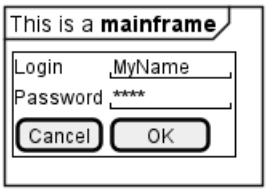
21.10.12 Work Breakdown Structure (WBS)

```
@startwbs
mainframe This is a **mainframe**
* r
** d1
** d2
@endwbs
```



21.10.13 Wireframe (SALT)

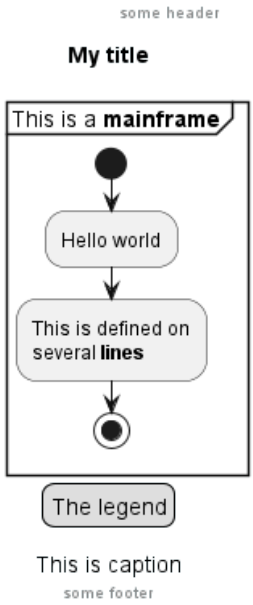
```
@startsalt
mainframe This is a **mainframe**
{+
  Login    | "MyName   "
  Password | "****     "
  [Cancel] | [  OK   ]
}
@endsalt
```



21.11 Appendix: Examples of title, header, footer, caption, legend and mainframe on all diagram

21.11.1 Activity

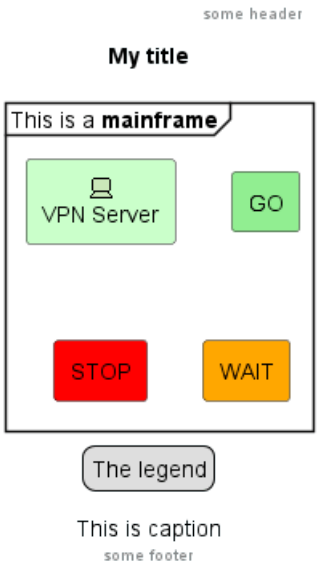
```
@startuml
mainframe This is a **mainframe**
header some header

footer some footer

title My title

caption This is caption

legend
The legend
end legend

start
:Hello world;
:This is defined on
several **lines**;
stop

@enduml
```



21.11.2 Archimate

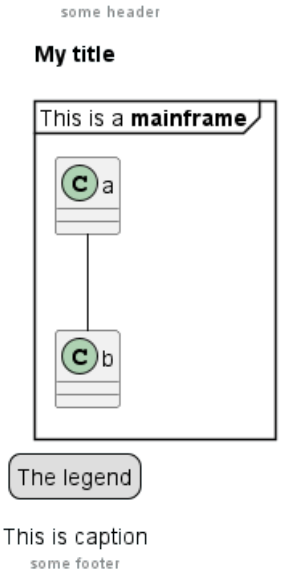
```
@startuml
mainframe This is a **mainframe**
header some header

footer some footer

title My title

caption This is caption
```

```
legend
The legend
end legend

archimate #Technology "VPN Server" as vpnServerA <<technology-device>>

rectangle GO #lightgreen
rectangle STOP #red
rectangle WAIT #orange

@enduml
```



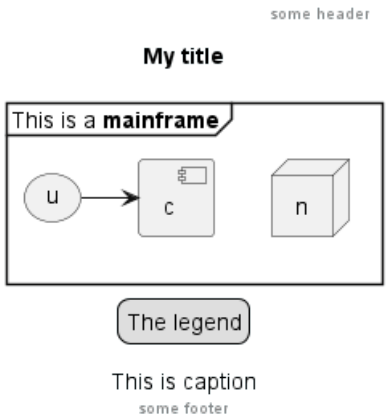
21.11.3 Class

```
@startuml
mainframe This is a **mainframe**
header some header

footer some footer

title My title

caption This is caption

legend
The legend
end legend

a -- b

@enduml
```



21.11.4 Component, Deployment, Use-Case

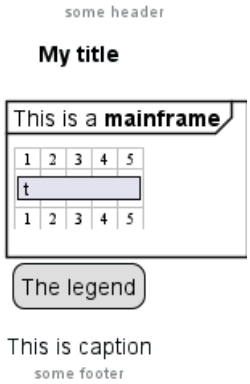
```
@startuml
mainframe This is a **mainframe**
header some header

footer some footer

title My title

caption This is caption

legend
The legend
end legend

node n
(u) -> [c]

@enduml
```



21.11.5 Gantt project planning

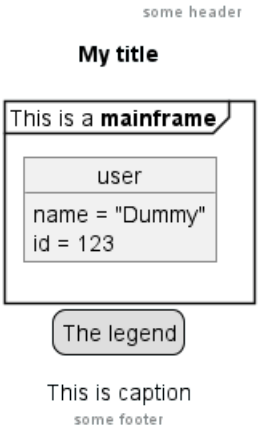
```
@startgantt
mainframe This is a **mainframe**
header some header
```

```
footer some footer

title My title

caption This is caption

legend
The legend
end legend


[t] lasts 5 days

@endgantt
```



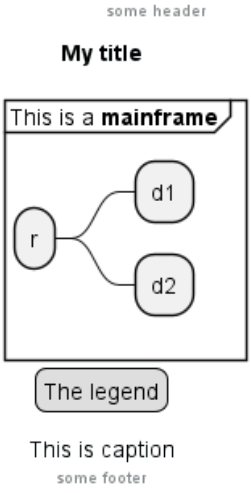
21.11.6 Object

```
@startuml
mainframe This is a **mainframe**
header some header

footer some footer

title My title

caption This is caption

legend
The legend
end legend

object user {
  name = "Dummy"
  id = 123
}

@enduml
```



21.11.7 MindMap

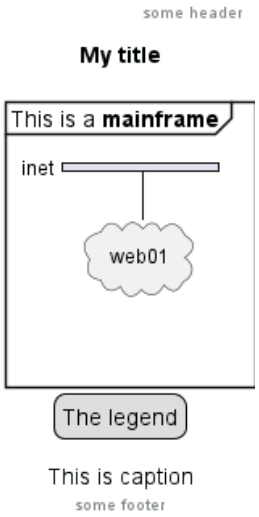
```
@startmindmap
mainframe This is a **mainframe**
header some header

footer some footer

title My title

caption This is caption

legend
The legend
end legend

* r
** d1
** d2

@endmindmap
```



21.11.8 Network (nwdiag)

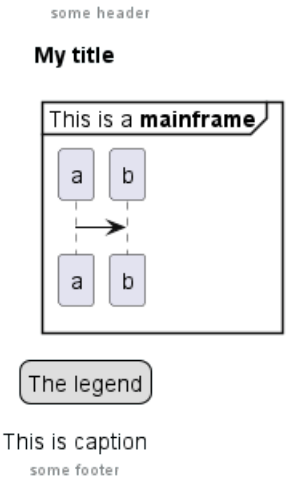
```
@startuml
mainframe This is a **mainframe**
header some header
```

```
footer some footer

title My title

caption This is caption

legend
The legend
end legend

nwdiag {
  network inet {
      web01 [shape = cloud]
  }
}

@enduml
```



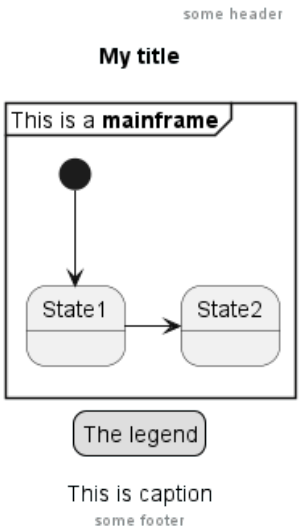
21.11.9 Sequence

```
@startuml
mainframe This is a **mainframe**
header some header

footer some footer

title My title

caption This is caption

legend
The legend
end legend

a->b
@enduml
```



21.11.10 State

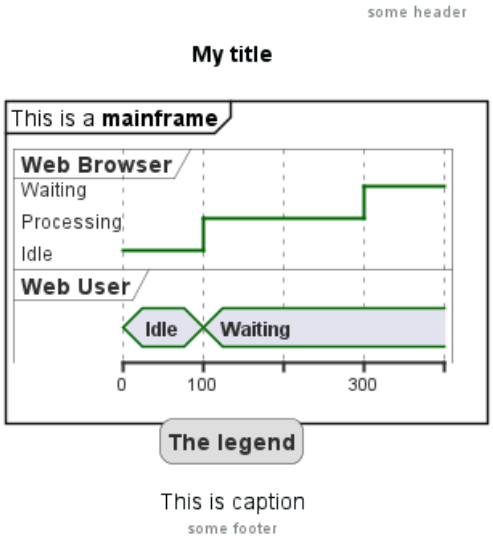
```
@startuml
mainframe This is a **mainframe**
header some header

footer some footer

title My title

caption This is caption

legend
The legend
end legend

[*] --> State1
State1 -> State2

@enduml
```



21.11.11 Timing

```
@startuml
mainframe This is a **mainframe**
```

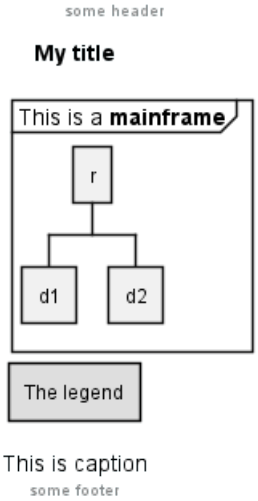
```
header some header

footer some footer

title My title

caption This is caption

legend
The legend
end legend

robust "Web Browser" as WB
concise "Web User" as WU

@0
WU is Idle
WB is Idle

@100
WU is Waiting
WB is Processing

@300
WB is Waiting

@enduml
```



21.11.12 Work Breakdown Structure (WBS)

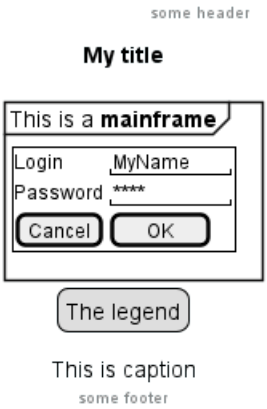
```
@startwbs
mainframe This is a **mainframe**
header some header

footer some footer

title My title

caption This is caption
```

```
legend
The legend
end legend

* r
** d1
** d2

@endwbs
```



21.11.13 Wireframe (SALT)

```
@startsalt
mainframe This is a **mainframe**
header some header

footer some footer

title My title

caption This is caption

legend
The legend
end legend

{+
  Login    | "MyName   "
  Password | "****     "
  [Cancel] | [  OK   ]
}
@endsalt
```


some header
My title
This is a mainframe
Login
MyName
Password
****
Cancel
OK
The legend
This is caption
some footer

22 Creole

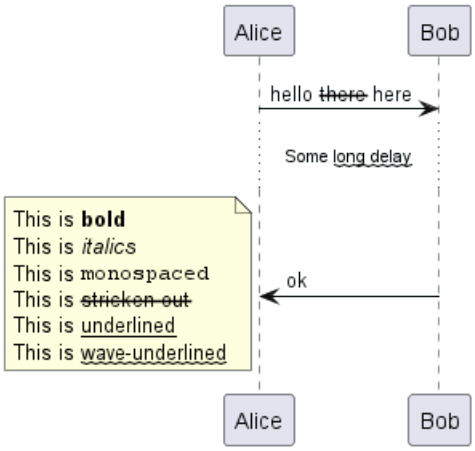
Creole is a lightweight common markup language for various wikis. A light-weight Creole engine is integrated in PlantUML to have a standardized way to emit styled text.

All diagrams support this syntax.

Note that compatibility with HTML syntax is preserved.

22.1 Emphasized text

```
@startuml
Alice -> Bob : hello --there-- here
... Some ~~long delay~~ ...
Bob -> Alice : ok
note left
  This is **bold**
  This is //italics//
  This is ""monospaced""
  This is --stricken-out--
  This is __underlined__
  This is ~~wave-underlined~~
end note
@enduml
```



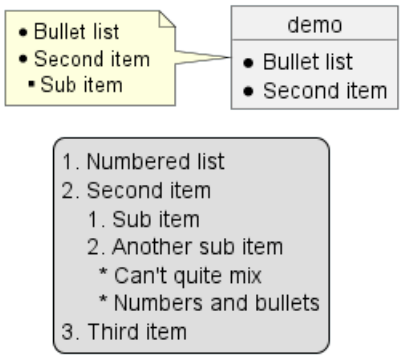
22.2 Lists

You can use numbered and bulleted lists in node text, notes, etc.

TODO: FIXME You cannot quite mix numbers and bullets in a list and its sublist.

```
@startuml
object demo {
  * Bullet list
  * Second item
}
note left
  * Bullet list
  * Second item
  ** Sub item
end note

legend
  # Numbered list
  # Second item
  ## Sub item
```

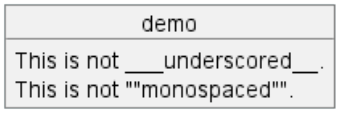
```
  ## Another sub item
        * Can't quite mix
        * Numbers and bullets
  # Third item
end legend
@enduml
```



22.3 Escape character

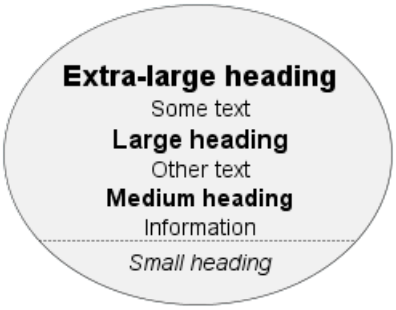
You can use the tilde ~ to escape special creole characters.

```
@startuml
object demo {
  This is not ~___underscored__.
  This is not ~""monospaced"".
}
@enduml
```



22.4 Headings

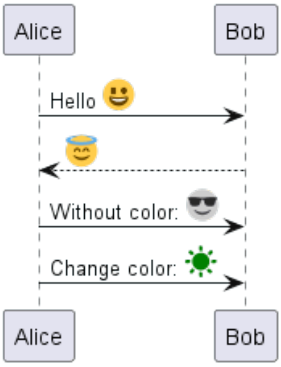
```
@startuml
usecase UC1 as "
= Extra-large heading
Some text
== Large heading
Other text
=== Medium heading
Information
....
==== Small heading"
@enduml
```



22.5 Emoji

All emojis from Twemoji (see EmojiTwo on Github) are available using the following syntax:

```
@startuml
Alice -> Bob : Hello <:1f600:>
return <:innocent:>
Alice -> Bob : Without color: <#0:sunglasses:>
Alice -> Bob : Change color: <#green:sunny:>
@enduml
```



Unlike Unicode Special characters that depend on installed fonts, the emoji are always available. Furthermore, emoji are already colored, but you can recolor them if you like (see examples above).

One can pick emoji from the emoji cheat sheet, the Unicode full-emoji-list, or the flat list emoji.txt in the plantuml source.

You can also use the following PlantUML command to list available emoji:

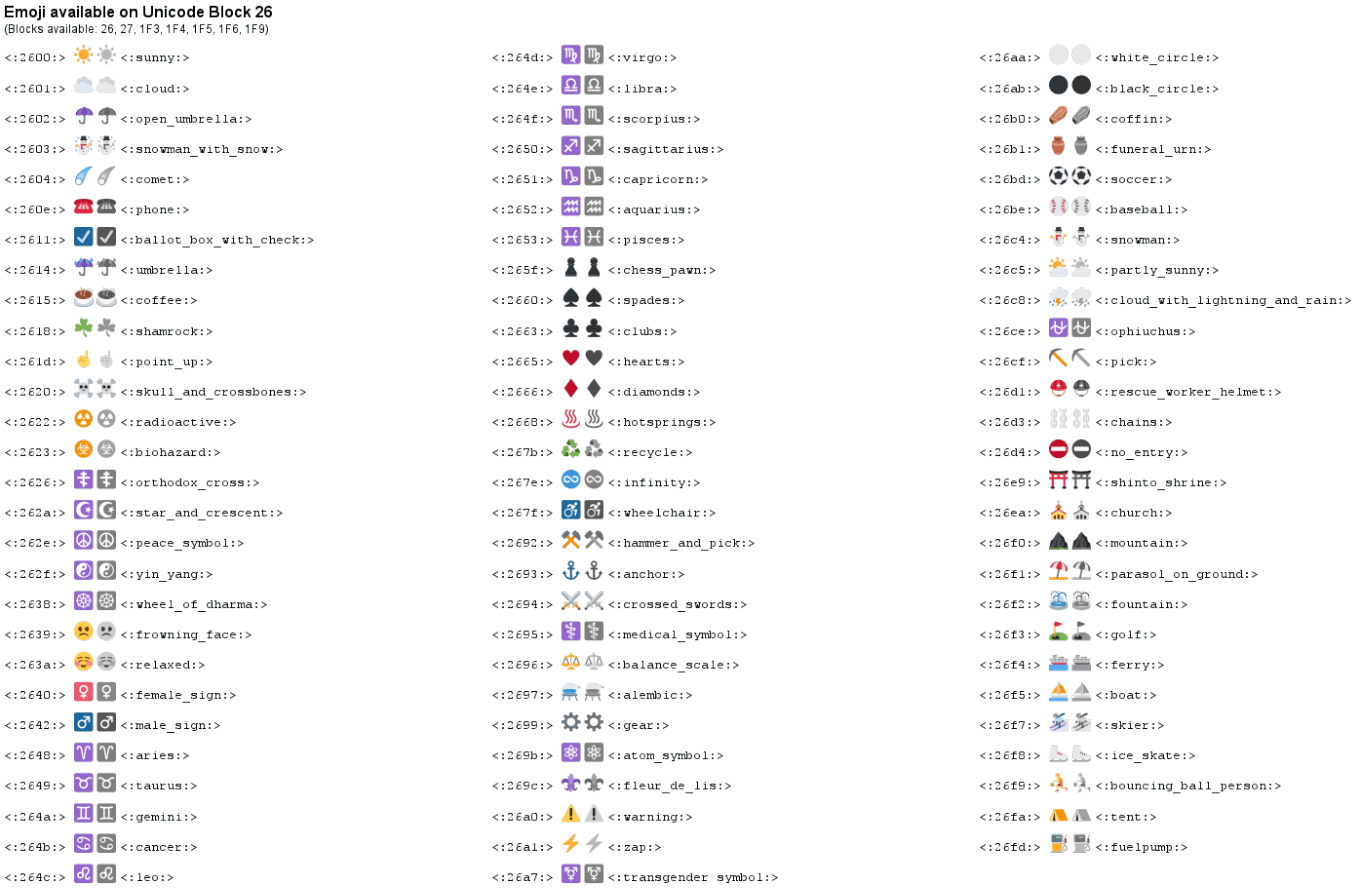
```
@startuml
emoji <block>
@enduml
```

As of 13 April 2023, you can select between 1174 emoji from the following Unicode blocks:

- Unicode block 26: 83 emoji
- Unicode block 27: 33 emoji
- Unicode block 1F3: 246 emoji
- Unicode block 1F4: 255 emoji
- Unicode block 1F5: 136 emoji
- Unicode block 1F6: 181 emoji
- Unicode block 1F9: 240 emoji

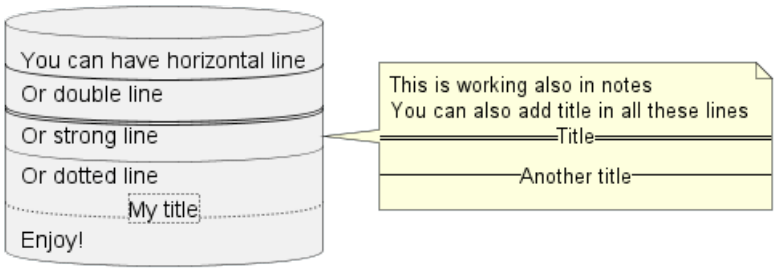
22.5.1 Unicode block 26

```
@startuml
emoji 26
@enduml
```



22.6 Horizontal lines

```
@startuml
database DB1 as "
You can have horizontal line
----
Or double line
====
Or strong line
----
Or dotted line
..My title..
Enjoy!
"
note right
  This is working also in notes
  You can also add title in all these lines
  ==Title==
  --Another title--
end note

@enduml
```



22.7 Links

You can also use URL and links.

Simple links are define using two square brackets (or three square brackets for field or method on class diagram).

Example:

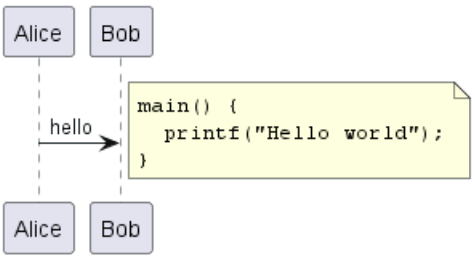
- `[[http://plantuml.com]]`
- `[[http://plantuml.com This label is printed]]`
- `[[http://plantuml.com{Optional tooltip} This label is printed]]`

URL can also be authenticated.

22.8 Code

You can use `<code>` to display some programming code in your diagram (sorry, syntax highlighting is not yet supported).

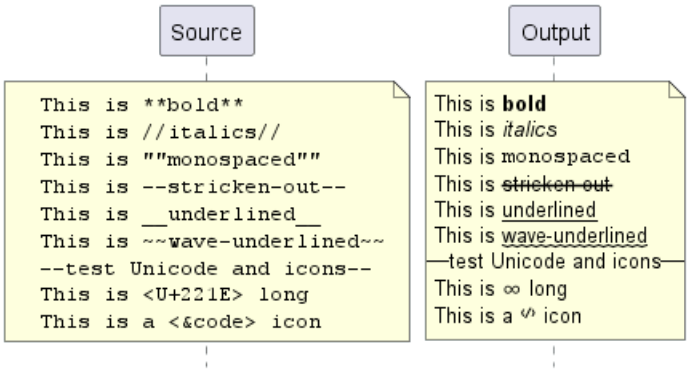
```
@startuml
Alice -> Bob : hello
note right
<code>
main() {
  printf("Hello world");
}
</code>
end note
@enduml
```



This is especially useful to illustrate some PlantUML code and the resulting rendering:

```
@startuml
hide footbox
note over Source
<code>
  This is **bold**
  This is //italics//
  This is ""monospaced""
  This is --stricken-out--
  This is __underlined__
```

```
  This is ~~wave-underlined~~
  --test Unicode and icons--
  This is <U+221E> long
  This is a <&code> icon
</code>
end note
/note over Output
  This is **bold**
  This is //italics//
  This is ""monospaced""
  This is --stricken-out--
  This is __underlined__
  This is ~~wave-underlined~~
  --test Unicode and icons--
  This is <U+221E> long
  This is a <&code> icon
end note
@enduml
```

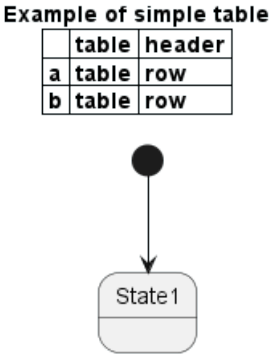


22.9 Table

22.9.1 Create a table

It is possible to build table, with | separator.

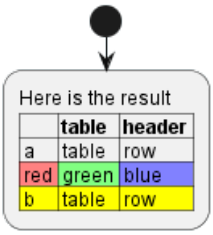
```
@startuml
skinparam titleFontSize 14
title
  Example of simple table
  |= |= table |= header |
  | a | table | row |
  | b | table | row |
end title
[*] --> State1
@enduml
```



22.9.2 Add color on rows or cells

You can specify background colors of rows and cells:

```
@startuml
start
:Here is the result
|= |= table |= header |
| a | table | row |
|<#FF8080> red |<#80FF80> green |<#8080FF> blue |
<#yellow>| b | table | row |;
@enduml
```



22.9.3 Add color on border and text

You can also specify colors of text and borders.

```
@startuml
title
<#lightblue,#red>|=  Step  |=  Date  |=  Name  |=  Status  |=  Link  |
<#lightgreen>|  1.1  |  TBD  | plantuml news |<#Navy><color:OrangeRed><b> Unknown  | [[https://plantu
end title
@enduml
```

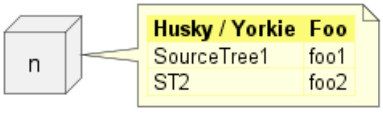
Step	Date	Name	Status	Link
1.1	TBD	plantuml news	Unknown	plantuml news

[Ref. QA-7184]

22.9.4 No border or same color as the background

You can also set the border color to the same color as the background.

```
@startuml
node n
note right of n
  <#FBFB77,#FBFB77>|= Husky / Yorkie |= Foo |
  | SourceTree1 | foo1 |
  | ST2 | foo2 |
end note
@enduml
```

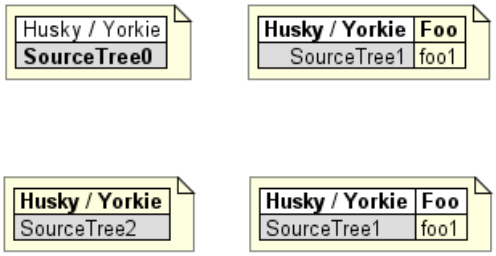


[Ref. QA-12448]

22.9.5 Bold header or not

= as the first char of a cell indicates whether to make it bold (usually used for headers), or not.

```
@startuml
note as deepCSS0
  |<#white> Husky / Yorkie |
  |=<#gainsboro> SourceTree0 |
endnote

note as deepCSS1
  |= <#white> Husky / Yorkie |= Foo |
  |<#gainsboro><r> SourceTree1 | foo1 |
endnote

note as deepCSS2
  |= Husky / Yorkie |
  |<#gainsboro> SourceTree2 |
endnote

note as deepCSS3
  <#white>|= Husky / Yorkie |= Foo |
  |<#gainsboro> SourceTree1 | foo1 |
endnote
@enduml
```



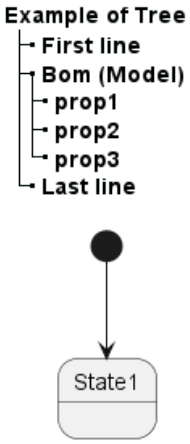
[Ref. QA-10923]

22.10 Tree

You can use |_ characters to build a tree.

On common commands, like title:

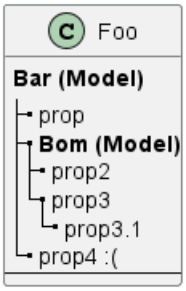
```
@startuml
skinparam titleFontSize 14
title
  Example of Tree
  |_ First line
  |_ **Bom (Model)**
    |_ prop1
    |_ prop2
    |_ prop3
  |_ Last line
end title
[*] --> State1
@enduml
```



On Class diagram.

(Please note how we have to use an empty second compartment, else the parentheses in **(Model)** cause that text to be moved to a separate first compartment):

```
@startuml
class Foo {
**Bar (Model)**
|_ prop
|_ **Bom (Model)**
  |_ prop2
  |_ prop3
    |_ prop3.1
|_ prop4 :(
--
}
@enduml
```

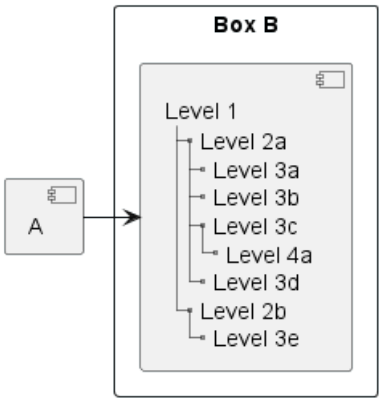


[Ref. QA-3448]

On Component or Deployment diagrams:

```
@startuml
[A] as A
rectangle "Box B" {
    component B [
        Level 1
        |_ Level 2a
          |_ Level 3a
          |_ Level 3b
          |_ Level 3c
            |_ Level 4a
          |_ Level 3d
        |_ Level 2b
          |_ Level 3e
```

```
    ]
}
A -> B
@enduml
```

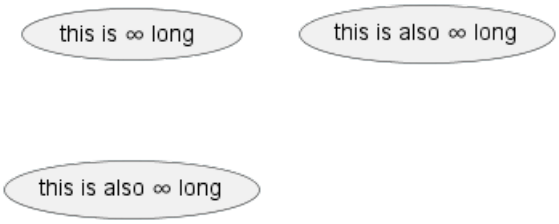


[Ref. QA-11365]

22.11 Special characters

It's possible to use any unicode character, either directly or with syntax `&#nnnnnn;` (decimal) or `<U+XXXXX>` (hex):

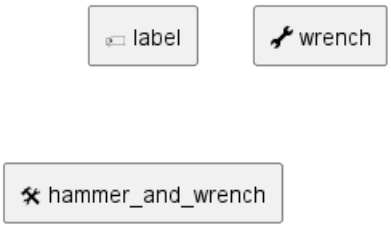
```
@startuml
usecase direct as "this is ∞ long"
usecase ampHash as "this is also ∞ long"
usecase angleBrackets as "this is also <U+221E> long"
@enduml
```



Please note that not all Unicode chars appear correctly, depending on installed fonts.

- You can use the listfonts command with a test string of your desired characters, to see which fonts may include them.
- For characters that are emoji, it's better to use the Emoji notation that doesn't depend on installed fonts, and the emoji are colored.
- The PlantUML server has the "Noto Emoji" font that has most emoji. If you want to render diagrams on your local system, you should check which fonts you have.
- Unfortunately "Noto Emoji" lacks normal chars, so you need to switch fonts, eg

```
@startuml
rectangle "<font:Noto Emoji><U+1F3F7></font> label"
rectangle "<font:Noto Emoji><U+1F527></font> wrench"
rectangle "<font:Noto Emoji><U+1F6E0></font> hammer_and_wrench"
@enduml
```



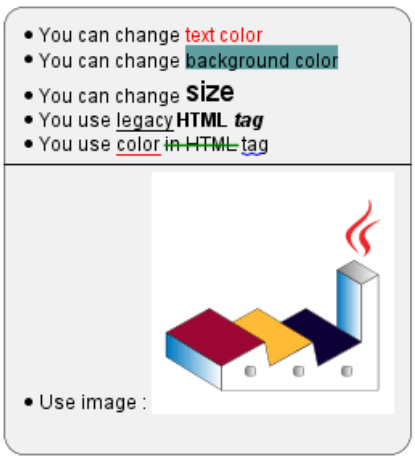
See Issue 72 for more details.

22.12 Legacy HTML

You can mix Creole with the following HTML tags:

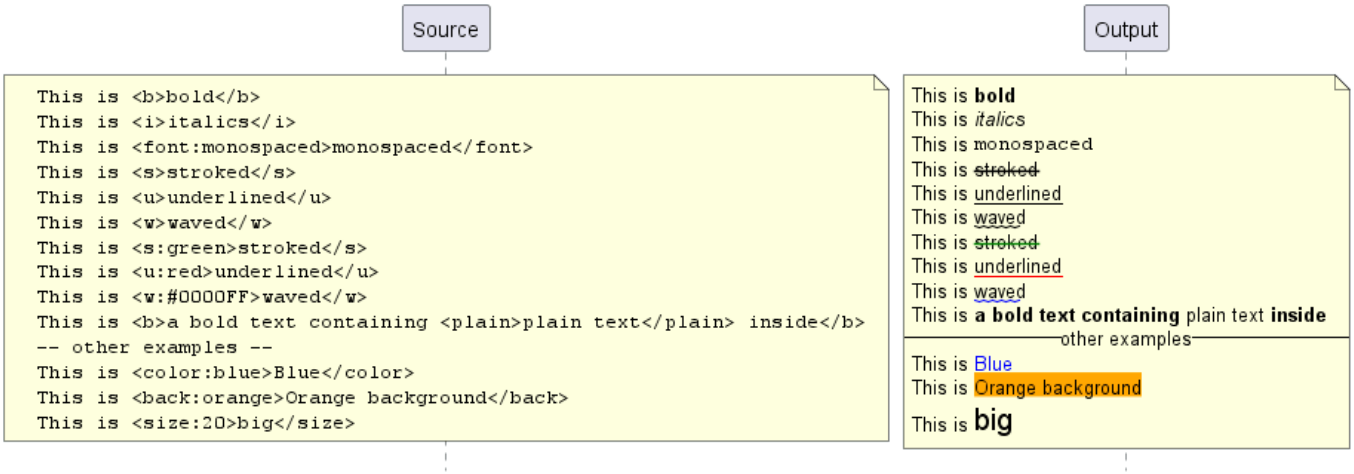
- `<b>` for bold text
- `<u>` or `<u:#AAAAAA>` or `<u:[[color|colorName]]>` for underline
- `<i>` for italic
- `<s>` or `<s:#AAAAAA>` or `<s:[[color|colorName]]>` for strike text
- `<w>` or `<w:#AAAAAA>` or `<w:[[color|colorName]]>` for wave underline text
- `<plain>` for plain text
- `<color:#AAAAAA>` or `<color:[[color|colorName]]>`
- `<back:#AAAAAA>` or `<back:[[color|colorName]]>` for background color
- `<size:nn>` to change font size
- `<img:file>` : the file must be accessible by the filesystem
- `<img:http://plantuml.com/logo3.png>` : the URL must be available from the Internet

```
@startuml
:* You can change <color:red>text color</color>
* You can change <back:cadetblue>background color</back>
* You can change <size:18>size</size>
* You use <u>legacy</u> <b>HTML <i>tag</i></b>
* You use <u:red>color</u> <s:green>in HTML</s> <w:#0000FF>tag</w>
----
* Use image : <img:http://plantuml.com/logo3.png>
;
@enduml
```



22.12.1 Common HTML element

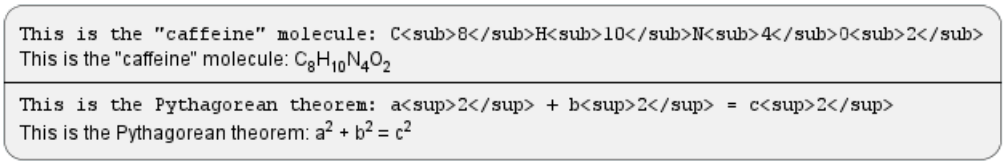
```
@startuml
hide footbox
note over Source
<code>
  This is <b>bold</b>
  This is <i>italics</i>
  This is <font:monospaced>monospaced</font>
  This is <s>stroked</s>
  This is <u>underlined</u>
  This is <w>waved</w>
  This is <s:green>stroked</s>
  This is <u:red>underlined</u>
  This is <w:#0000FF>waved</w>
  This is <b>a bold text containing <plain>plain text</plain> inside</b>
  -- other examples --
  This is <color:blue>Blue</color>
  This is <back:orange>Orange background</back>
  This is <size:20>big</size>
</code>
end note
/note over Output
  This is <b>bold</b>
  This is <i>italics</i>
  This is <font:monospaced>monospaced</font>
  This is <s>stroked</s>
  This is <u>underlined</u>
  This is <w>waved</w>
  This is <s:green>stroked</s>
  This is <u:red>underlined</u>
  This is <w:#0000FF>waved</w>
  This is <b>a bold text containing <plain>plain text</plain> inside</b>
  -- other examples --
  This is <color:blue>Blue</color>
  This is <back:orange>Orange background</back>
  This is <size:20>big</size>
end note
@enduml
```



[Ref. QA-5254 for `plain`]

22.12.2 Subscript and Superscript element [sub, sup]

```
@startuml
:<code>
This is the "caffeine" molecule: C<sub>8</sub>H<sub>10</sub>N<sub>4</sub>O<sub>2</sub>
</code>
This is the "caffeine" molecule: C<sub>8</sub>H<sub>10</sub>N<sub>4</sub>O<sub>2</sub>
----
<code>
This is the Pythagorean theorem: a<sup>2</sup> + b<sup>2</sup> = c<sup>2</sup>
</code>
This is the Pythagorean theorem: a<sup>2</sup> + b<sup>2</sup> = c<sup>2</sup>;
@enduml
```

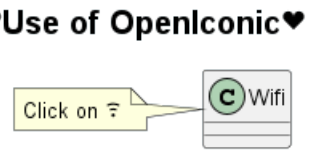


22.13 OpenIconic

OpenIconic is a very nice open-source icon set. Those icons are integrated in the creole parser, so you can use them out-of-the-box.

Use the following syntax: `<&ICON_NAME>`.

```
@startuml
title: <size:20><&heart>Use of OpenIconic<&heart></size>
class Wifi
note left
  Click on <&wifi>
end note
@enduml
```



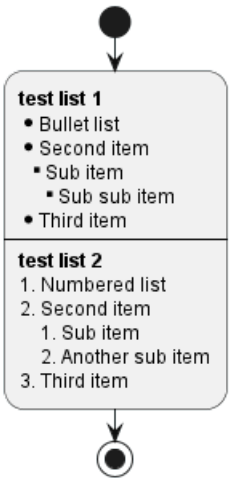
The complete list is available with the following special command:

```
@startuml
listopeniconic
@enduml
```

22.14 Appendix: Examples of "Creole List" on all diagrams

22.14.1 Activity

```
@startuml
start
:**test list 1**
* Bullet list
* Second item
** Sub item
*** Sub sub item
* Third item
----
**test list 2**
# Numbered list
# Second item
## Sub item
## Another sub item
# Third item;
stop
@enduml
```



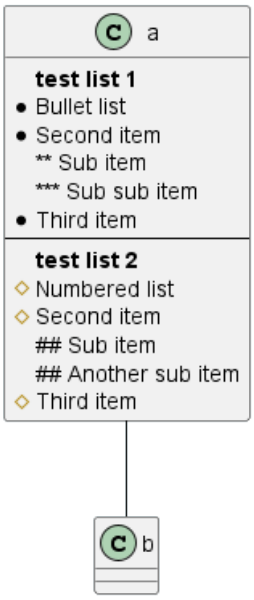
22.14.2 Class

TODO: FIXME

- *Sub item*
- *Sub sub item*

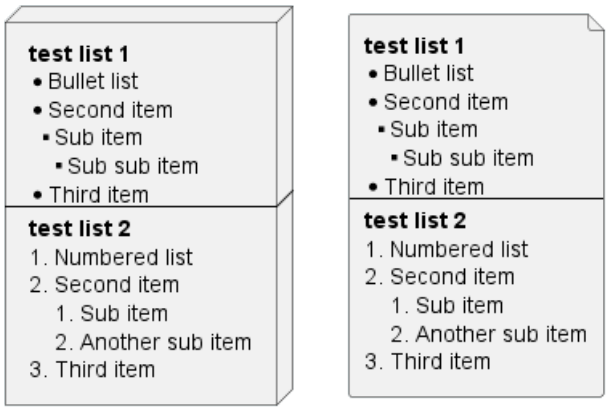
TODO: FIXME

```
@startuml

class a {
**test list 1**
* Bullet list
* Second item
** Sub item
*** Sub sub item
* Third item
----
**test list 2**
# Numbered list
# Second item
## Sub item
## Another sub item
# Third item
}

a -- b

@enduml
```



22.14.3 Component, Deployment, Use-Case

```
@startuml
node n [
**test list 1**
* Bullet list
* Second item
** Sub item
*** Sub sub item
* Third item
----
**test list 2**
# Numbered list
# Second item
## Sub item
## Another sub item
# Third item
]

file f as "
**test list 1**
* Bullet list
* Second item
** Sub item
*** Sub sub item
* Third item
----
**test list 2**
# Numbered list
# Second item
## Sub item
## Another sub item
# Third item
"
@enduml
```



TODO: DONE *[Corrected in V1.2020.18]*

22.14.4 Gantt project planning

N/A

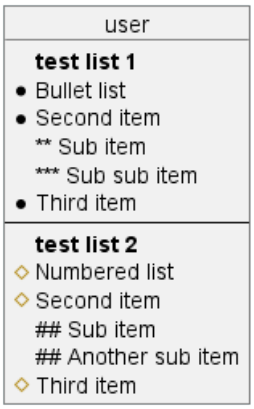
22.14.5 Object

TODO: FIXME

- *Sub item*
- *Sub sub item*

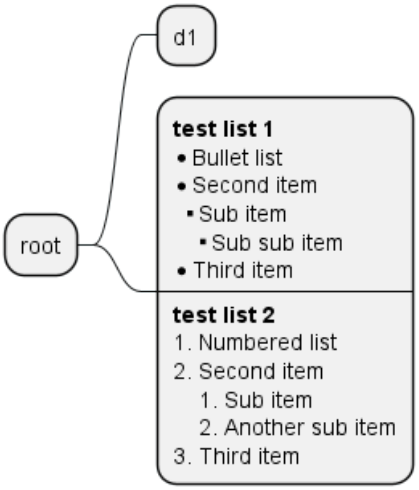
TODO: FIXME

```
@startuml
object user {
**test list 1**
* Bullet list
* Second item
** Sub item
*** Sub sub item
* Third item
----
**test list 2**
# Numbered list
# Second item
## Sub item
## Another sub item
# Third item
}

@enduml
```



22.14.6 MindMap

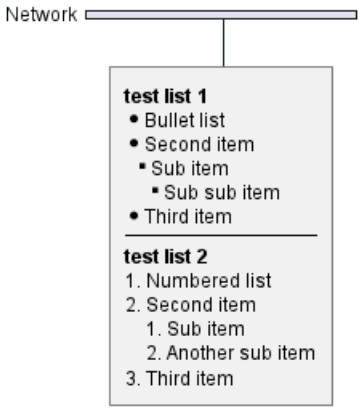
```
@startmindmap

* root
** d1
**:**test list 1**
* Bullet list
* Second item
** Sub item
*** Sub sub item
* Third item
----
**test list 2**
# Numbered list
# Second item
## Sub item
## Another sub item
# Third item;


@endmindmap
```



22.14.7 Network (nwdiag)

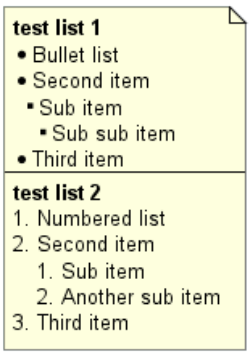
```
@startuml
nwdiag {
```

```
  network Network {
      Server [description="**test list 1**\n* Bullet list\n* Second item\n** Sub item\n*** Sub sub i
}
@enduml
```



22.14.8 Note

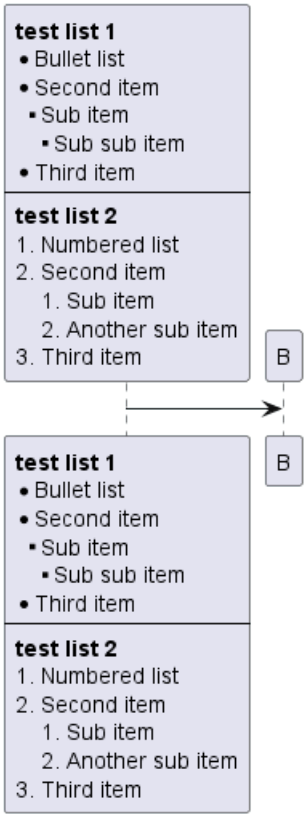
```
@startuml
note as n
**test list 1**
* Bullet list
* Second item
** Sub item
*** Sub sub item
* Third item
----
**test list 2**
# Numbered list
# Second item
## Sub item
## Another sub item
# Third item
end note
@enduml
```



22.14.9 Sequence

```
@startuml
<style>
participant {HorizontalAlignment left}
</style>
```

```
participant Participant [
**test list 1**
* Bullet list
* Second item
** Sub item
*** Sub sub item
* Third item
----
**test list 2**
# Numbered list
# Second item
## Sub item
## Another sub item
# Third item
]

participant B

Participant -> B
@enduml
```

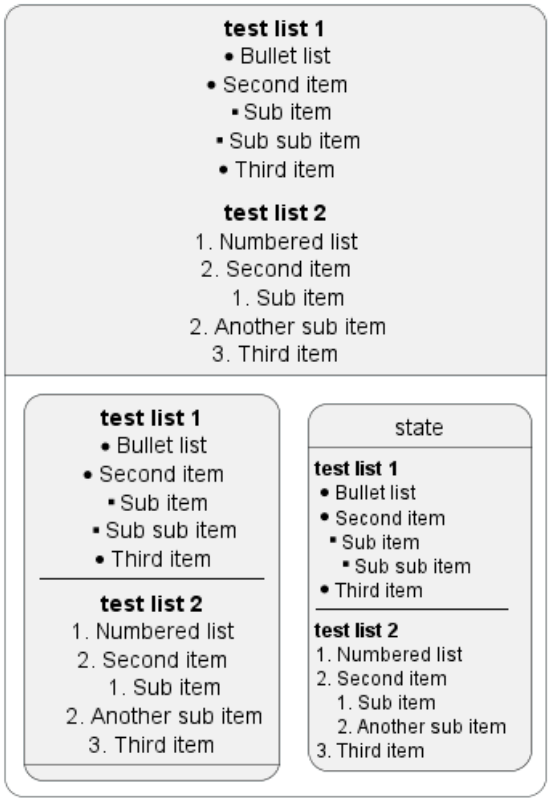


[Ref. QA-15232]

22.14.10 State

```
@startuml
<style>
stateDiagram {
title {HorizontalAlignment left}
}
</style>
state "**test list 1**\n* Bullet list\n* Second item\n** Sub item\n*** Sub sub item\n* Third item\n-
state "**test list 1**\n* Bullet list\n* Second item\n** Sub item\n*** Sub sub item\n* Third item\n-
```

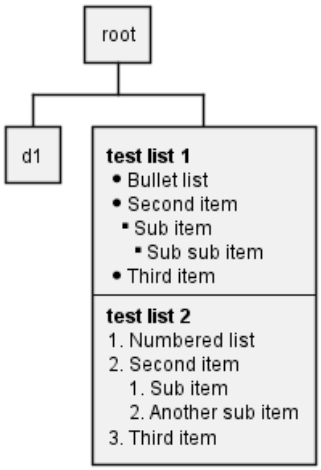
```
state : **test list 1**\n* Bullet list\n* Second item\n** Sub item\n*** Sub sub item\n* Third item\n
}
@enduml
```



[Ref. QA-16978]

22.14.11 WBS

```
@startwbs

* root
** d1
**:**test list 1**
* Bullet list
* Second item
** Sub item
*** Sub sub item
* Third item
----
**test list 2**
# Numbered list
# Second item
## Sub item
## Another sub item
# Third item;

@endwbs
```

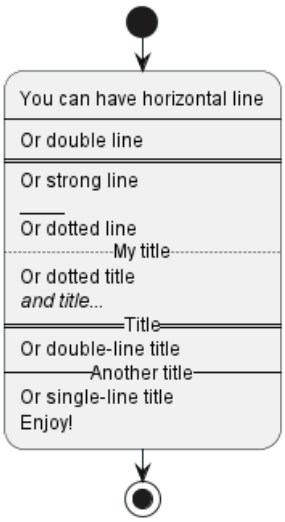


22.15 Appendix: Examples of "Creole horizontal lines" on all diagrams

22.15.1 Activity

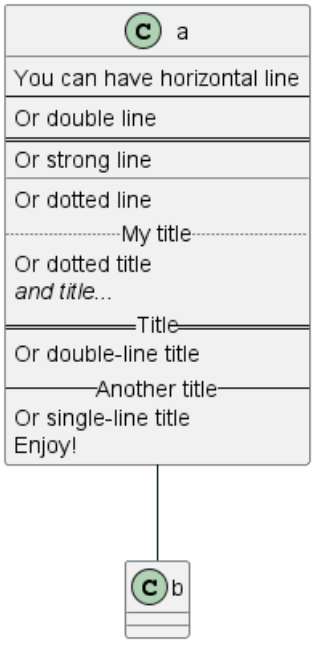
TODO: FIXME strong line ____ **TODO:** FIXME

```
@startuml
start
:You can have horizontal line
----
Or double line
====
Or strong line

____
Or dotted line
..My title..
Or dotted title
//and title... //
==Title==
Or double-line title
--Another title--
Or single-line title
Enjoy!;
stop
@enduml
```



22.15.2 Class

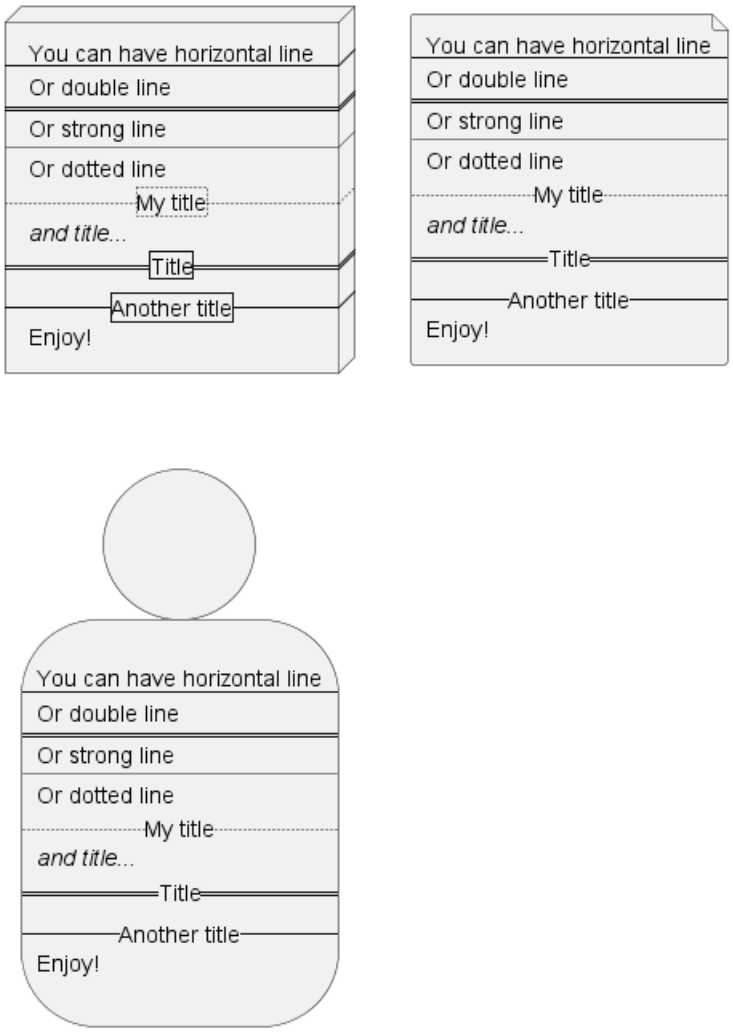
```
@startuml

class a {
You can have horizontal line
----
Or double line
====
Or strong line
----
Or dotted line
..My title..
Or dotted title
//and title... //
==Title==
Or double-line title
--Another title--
Or single-line title
Enjoy!
}

a -- b

@enduml
```



22.15.3 Component, Deployment, Use-Case

```
@startuml
node n [
You can have horizontal line
----
Or double line
====
Or strong line
----
Or dotted line
..My title..
```

```
//and title... //
==Title==
--Another title--
Enjoy!
]

file f as "
You can have horizontal line
----
Or double line
====
Or strong line
----
Or dotted line
..My title..
//and title... //
==Title==
--Another title--
Enjoy!
"

person p [

You can have horizontal line
----
Or double line
====
Or strong line
----
Or dotted line
..My title..
//and title... //
==Title==
--Another title--
Enjoy!

]
@enduml
```

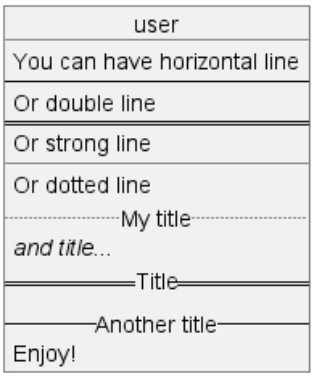


22.15.4 Gantt project planning

N/A

22.15.5 Object

```
@startuml
object user {
You can have horizontal line
----
Or double line
====
Or strong line
----
Or dotted line
..My title..
//and title... //
==Title==
--Another title--
Enjoy!
}

@enduml
```

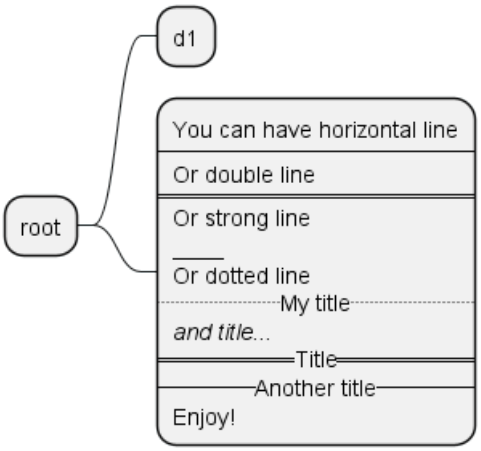


TODO: DONE *[Corrected on V1.2020.18]*

22.15.6 MindMap

TODO: FIXME strong line `____` **TODO:** FIXME

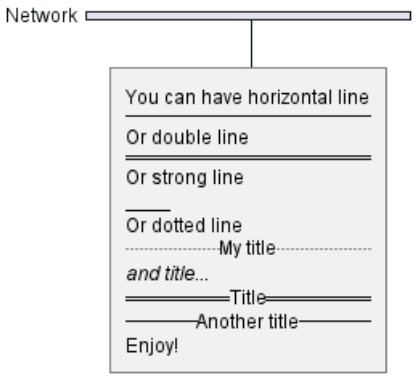
```
@startmindmap

* root
** d1
**:You can have horizontal line
----
Or double line
====
Or strong line
____
Or dotted line
..My title..
//and title... //
==Title==
--Another title--
Enjoy!;

@endmindmap
```



22.15.7 Network (nwdiag)

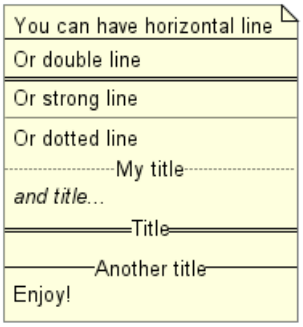
```
@startuml
nwdiag {
  network Network {
```

```
      Server [description="You can have horizontal line\n----\nOr double line\n====\nOr strong line\n
}
@enduml
```



22.15.8 Note

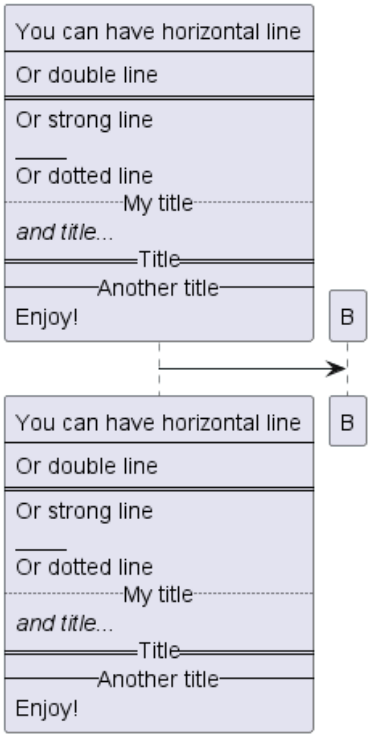
```
@startuml
note as n
You can have horizontal line
----
Or double line
====
Or strong line
----
Or dotted line
..My title..
//and title... //
==Title==
--Another title--
Enjoy!
end note
@enduml
```



22.15.9 Sequence

```
@startuml
<style>
participant {HorizontalAlignment left}
</style>
participant Participant [
You can have horizontal line
----
Or double line
```

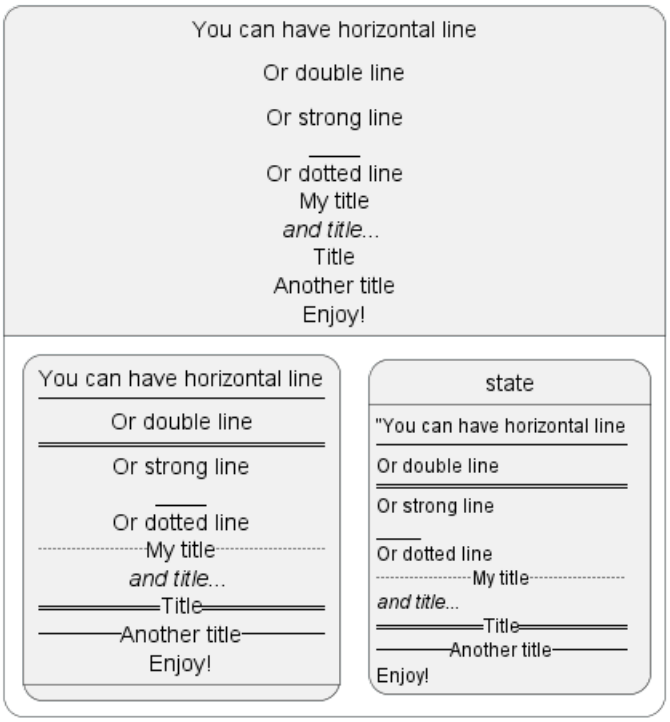
```
====
Or strong line
____
Or dotted line
..My title..
//and title... //
==Title==
--Another title--
Enjoy!
]

participant B

Participant -> B
@enduml
```



[Ref. QA-15232]

22.15.10 State

```
@startuml
<style>
stateDiagram {
title {HorizontalAlignment left}
}
</style>
state "You can have horizontal line\n----\nOr double line\n====\nOr strong line\n____\nOr dotted line
state "You can have horizontal line\n----\nOr double line\n====\nOr strong line\n____\nOr dotted line
state : "You can have horizontal line\n----\nOr double line\n====\nOr strong line\n____\nOr dotted li
}
@enduml
```

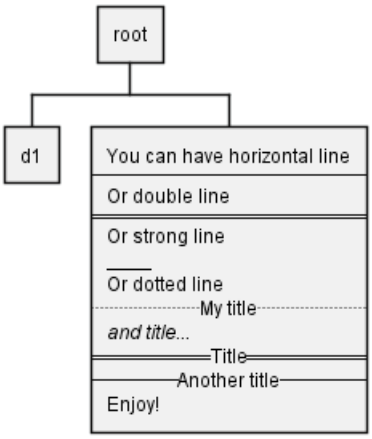


[Ref. QA-16978]

22.15.11 WBS

TODO: FIXME strong line ____ **TODO:** FIXME

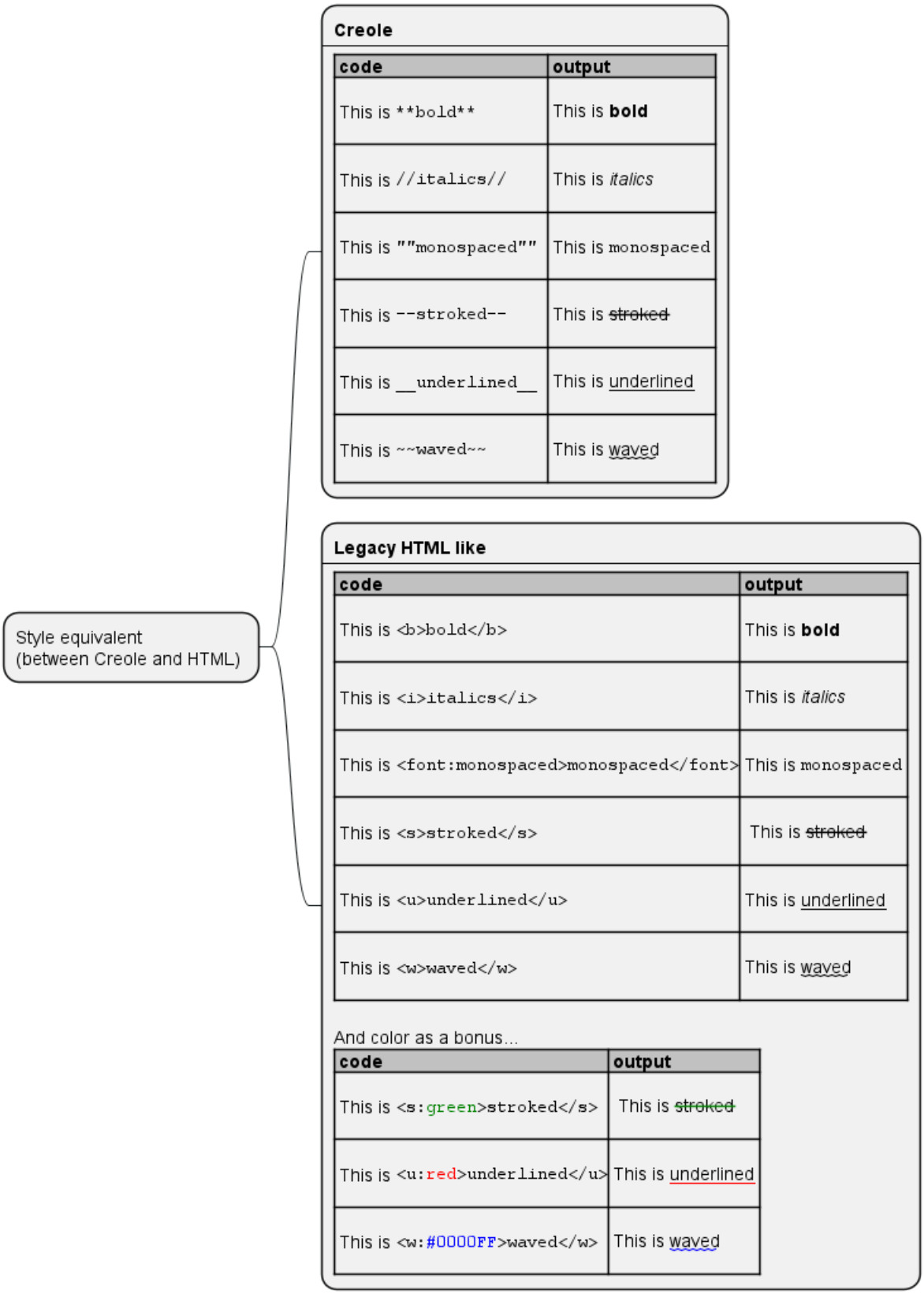
```
@startwbs

* root
** d1
**:You can have horizontal line
----
Or double line
====
Or strong line
____
Or dotted line
..My title..
//and title... //
==Title==
--Another title--
Enjoy!;

@endwbs
```



22.16 Style equivalent (between Creole and HTML)

Style	Creole	Legacy HTML like
bold	This is **bold**	This is bold
italics	This is //italics//	This is italics
monospaced	This is ""monospaced""	This is <font:monospaced>monospaced</font>
stroked	This is --stroked--	This is <s>stroked</s>
underlined	This is __underlined__	This is <u>underlined</u>
waved	This is ~~~	This is <w>waved</w>

```
@startmindmap
* Style equivalent\n(between Creole and HTML)
**:**Creole**
----
<#silver>|= code|= output|
| \n This is ""~**bold**""\n | \n This is **bold** |
| \n This is ""~//italics//""\n | \n This is //italics// |
| \n This is ""~""monospaced~"" ""\n | \n This is ""monospaced"" |
| \n This is ""~--stroked--""\n | \n This is --stroked-- |
| \n This is ""~__underlined__""\n |  \n This is __underlined__ |
| \n This is ""<U+007E><U+007E>waved<U+007E><U+007E>""\n | \n This is ~~waved~~ |;
**:<b>Legacy HTML like
----
<#silver>|= code|= output|
| \n This is ""~<b>bold</b>""\n | \n This is <b>bold</b> |
| \n This is ""~<i>italics</i>""\n | \n This is <i>italics</i> |
| \n This is ""~<font:monospaced>monospaced</font>""\n | \n This is <font:monospaced>monospaced</fon
| \n This is ""~<s>stroked</s>""\n | \n  This is <s>stroked</s> |
| \n This is ""~<u>underlined</u>""\n | \n This is <u>underlined</u> |
| \n This is ""~<w>waved</w>""\n | \n This is <w>waved</w> |

And color as a bonus...
<#silver>|= code|= output|
| \n This is ""~<s:""<color:green>""green""</color>"">stroked</s>""\n | \n  This is <s:green>stroked
| \n This is ""~<u:""<color:red>""red""</color>"">underlined</u>""\n | \n This is <u:red>underlined</
| \n This is ""~<w:""<color:#0000FF>""#0000FF""</color>"">waved</w>""\n | \n This is <w:#0000FF>wave
@endmindmap
```


Style equivalent
(between Creole and HTML)
Creole
code
output
This is **bold**
This is bold
This is //italics//
This is italics
This is ""monospaced""
This is monospaced
This is --stroked--
This is stroked
This is __underlined__
This is underlined
This is ~~waved~~
This is waved
Legacy HTML like
code
output
This is bold
This is bold
This is italics
This is italics
This is <font:monospaced>monospaced</font>
This is monospaced
This is <s>stroked</s>
This is stroked
This is <u>underlined</u>
This is underlined
This is <w>waved</w>
This is waved
And color as a bonus...
code
output
This is <s:green>stroked</s>
This is stroked
This is <u:red>underlined</u>
This is underlined
This is <w:#0000FF>waved</w>
This is waved

23 Defining and using sprites

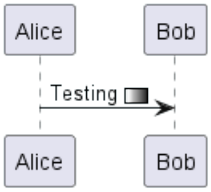
A *Sprite* is a small graphic element that can be used in diagrams.

In PlantUML, sprites are monochrome and can have either 4, 8 or 16 gray level.

To define a sprite, you have to use a hexadecimal digit between 0 and F per pixel.

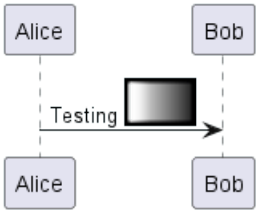
Then you can use the sprite using `<$XXX>` where XXX is the name of the sprite.

```
@startuml
sprite $foo1 {
  FFFFFFFFFFFFFFFF
  F0123456789ABCF
  F0123456789ABCF
  F0123456789ABCF
  F0123456789ABCF
  F0123456789ABCF
  F0123456789ABCF
  F0123456789ABCF
  F0123456789ABCF
  F0123456789ABCF
  FFFFFFFFFFFFFFFF
}
Alice -> Bob : Testing <$foo1>
@enduml
```



You can scale the sprite.

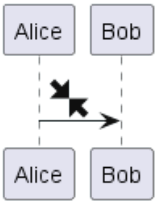
```
@startuml
sprite $foo1 {
  FFFFFFFFFFFFFFFF
  F0123456789ABCF
  F0123456789ABCF
  F0123456789ABCF
  F0123456789ABCF
  F0123456789ABCF
  F0123456789ABCF
  F0123456789ABCF
  F0123456789ABCF
  FFFFFFFFFFFFFFFF
}
Alice -> Bob : Testing <$foo1{scale=3}>
@enduml
```



23.1 Inline SVG sprite

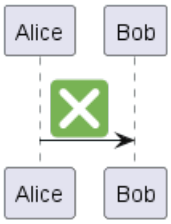
You can also use inlined SVG for sprites. Only a tiny subset of SVG directives is possible, so you probably have to compress existing SVG files using https://vecta.io/nano.

```
@startuml
sprite foo1 <svg width="8" height="8" viewBox="0 0 8 8"><path d="M1 0l-1 1 1.5 1.5-1.5 1.5h4v-4l-1.5

Alice->Bob : <$foo1*3>
@enduml
```



Another example:

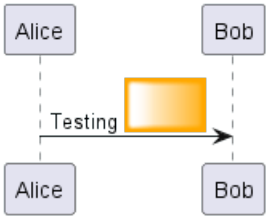
```
@startuml
sprite foo1 <svg viewBox="0 0 36 36">
<path fill="#77B255" d="M36 32c0 2.209-1.791 4-4 4H4c-2.209 0-4-1.791-4-4V4c0-2.209 1.791-4 4-4h28c2
<path fill="#FFF" d="M21.529 18.00618.238-8.238c.977-.976.977-2.559 0-3.535-.977-.977-2.559-.977-3.53
</svg>

Alice->Bob : <$foo1>

@enduml
```



23.2 Changing colors

Although sprites are monochrome, it's possible to change their color.

```
@startuml
sprite $foo1 {
  FFFFFFFFFFFFFFF
  F0123456789ABCF
  F0123456789ABCF
  F0123456789ABCF
  F0123456789ABCF
  F0123456789ABCF
  F0123456789ABCF
  F0123456789ABCF
  F0123456789ABCF
  FFFFFFFFFFFFFFF
}
Alice -> Bob : Testing <$foo1,scale=3.4,color=orange>
@enduml
```



23.3 Encoding Sprite

To encode sprite, you can use the command line like:

```
java -jar plantuml.jar -encodesprite 16z foo.png
```

where `foo.png` is the image file you want to use (it will be converted to gray automatically).

After `-encodesprite`, you have to specify a format: `4, 8, 16, 4z, 8z` or `16z`.

The number indicates the gray level and the optional `z` is used to enable compression in sprite definition.

23.4 Importing Sprite

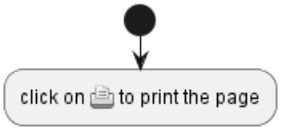
You can also launch the GUI to generate a sprite from an existing image.

Click in the menubar then on `File/Open Sprite Window`.

After copying an image into you clipboard, several possible definitions of the corresponding sprite will be displayed : you will just have to pickup the one you want.

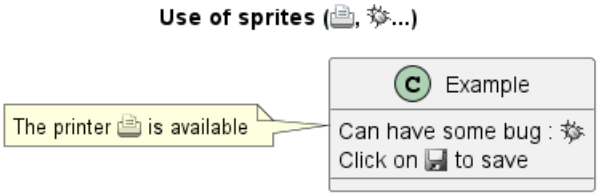
23.5 Examples

```
@startuml
sprite $printer [15x15/8z] NOtH3W0W208HxFz_kMAhj7lHWpa1XC716sz0Pq4MVPEWfBHIuxP3L6kbTcizR8tAhzaqFvXwvl
start
:click on <$printer> to print the page;
@enduml
```




```
@startuml
 sprite $bug [15x15/16z] PKzR2i0m2BFMi15p__FEjQEqB1z27aeqCqixa8S4OT7C53cKpsHpaYPDJY_12MHM-BLRyywPhrrl
 sprite $printer [15x15/8z] NOtH3W0W208HxFz_kMAhj7lHWpa1XC716sz0Pq4MVPEWfBHIuxP3L6kbTcizR8tAhzaqFvXwv
 sprite $disk {
   444445566677881
   436000000009991
   43600000000ACA1
   53700000001A7A1
   53700000012B8A1
   53800000123B8A1
   63800001233C9A1
   634999AABBC99B1
   744566778899AB1
   7456AAAAA99AAB1
   8566AFC228AABB1
   8567AC8118BBBB1
   867BD4433BBBBB1
   39AAAAABBBBBBC1
}
```

```
title Use of sprites (<$printer>, <$bug>...)

class Example {
Can have some bug : <$bug>
Click on <$disk> to save
}

note left : The printer <$printer> is available

@enduml
```



23.6 StdLib

The PlantUML StdLib includes a number of ready icons in various IT areas such as architecture, cloud services, logos etc. It including AWS, Azure, Kubernetes, C4, product Logos and many others. To explore these libraries:

- Browse the Github folders of PlantUML StdLib
- Browse the source repos of StdLib collections that interest you. Eg if you are interested in logos you can find that it came from gilbarbara-plantuml-sprites, and quickly find its

sprites-list. (The next section shows how to list selected sprites but unfortunately that's in grayscale whereas this custom listing is in color.)

- Study the in-depth Hitchhiker' s Guide to PlantUML, eg sections Standard Library Sprites and PlantUML Stdlib Overview

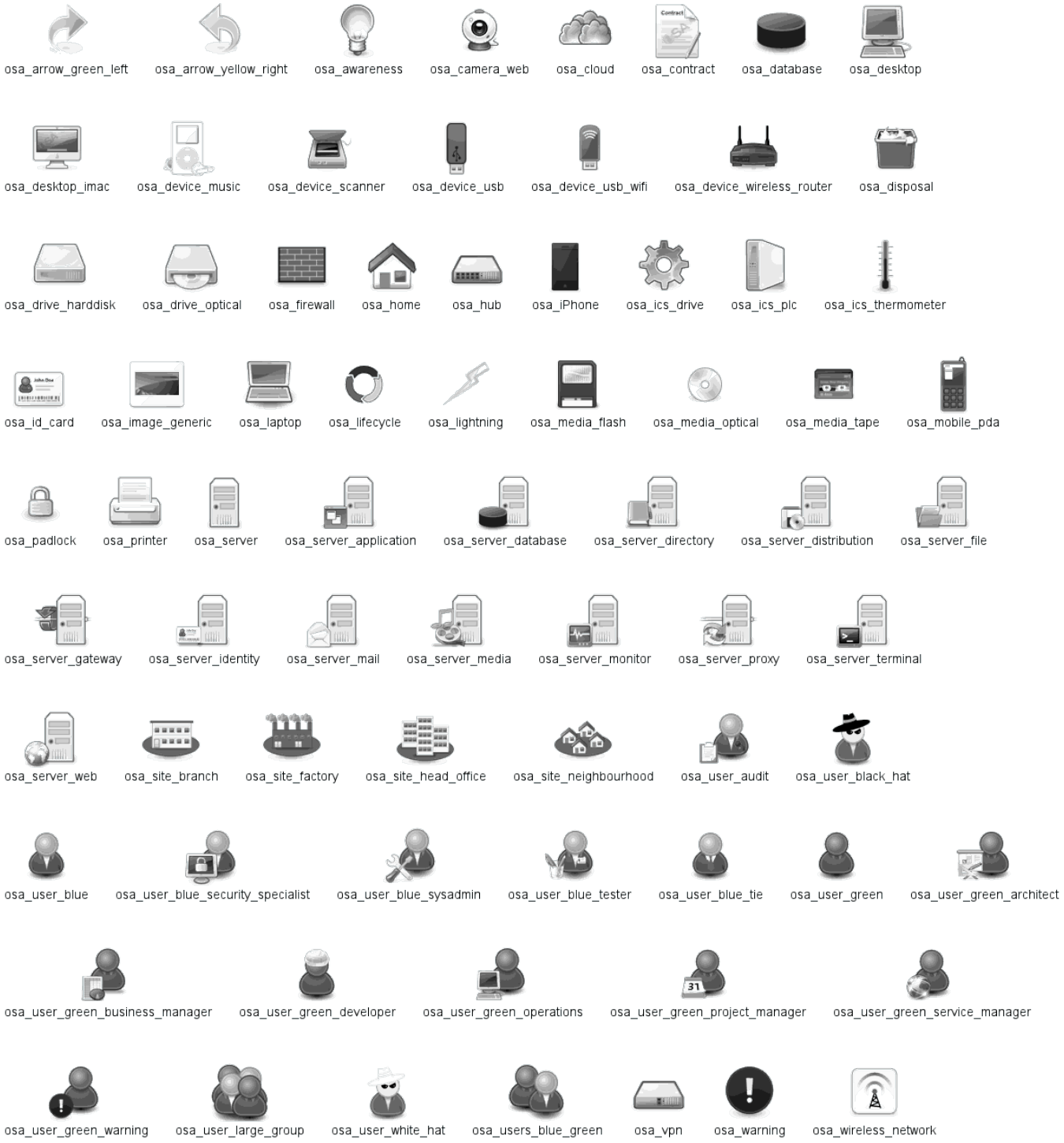
23.7 Listing Sprites

You can use the `listsprites` command to show available sprites:

- Used on its own, it just shows ArchiMate sprites
- If you include some sprite libraries in your diagram, the command shows all these sprites, as explained in View all the icons with listsprites.

(Example from Hitchhikers Guide to PlantUML)

```
@startuml
!define osaPuml https://raw.githubusercontent.com/Crashedmind/PlantUML-opensecurityarchitecture2-ico
!include osaPuml/Common.puml
!include osaPuml/User/all.puml
!include osaPuml/Hardware/all.puml
!include osaPuml/Misc/all.puml
!include osaPuml/Server/all.puml
!include osaPuml/Site/all.puml

listsprites

' From The Hitchhiker' s Guide to PlantUML
@enduml
```



Most collections have files called `all` that allow you to see a whole sub-collection at once. Else you need to find the sprites that interest you and include them one by one. Unfortunately, the version of a collection included in StdLib often does not have such `all` files, so as you see above we include the collection from github, not from StdLib.

All sprites are in grayscale, but most collections define specific macros that include appropriate (vendor-specific) colors.

24 Skinparam Befehl

Die Farben und die Schrift der Zeichnung können mittels `skinparam` verändert werden.

Beispiel:

```
skinparam backgroundColor transparent
```

24.1 Usage

You can use this command :

- In the diagram definition, like any other commands,
- In an included file,
- In a configuration file, provided in the command line or the ANT task.

24.2 Nested

To avoid repetition, it is possible to nest definition. So the following definition :

```
skinparam xxxxParam1 value1
skinparam xxxxParam2 value2
skinparam xxxxParam3 value3
skinparam xxxxParam4 value4
```

is strictly equivalent to:

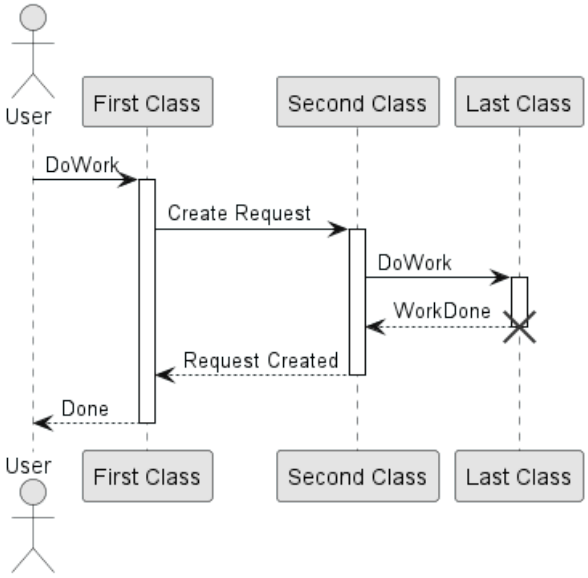
```
skinparam xxxx {
    Param1 value1
    Param2 value2
    Param3 value3
    Param4 value4
}
```

24.3 Black and White

You can force the use of a black&white output using `skinparam monochrome true` command.

```
@startuml

skinparam monochrome true

actor User
participant "First Class" as A
participant "Second Class" as B
participant "Last Class" as C

User -> A: DoWork
activate A

A -> B: Create Request
activate B

B -> C: DoWork
activate C
C --> B: WorkDone
destroy C

B --> A: Request Created
deactivate B
```

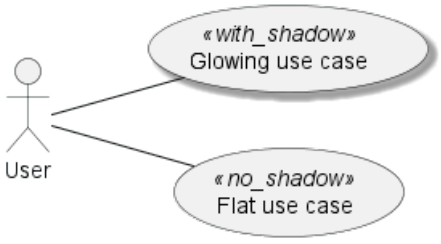
```
A --> User: Done
deactivate A

@enduml
```



24.4 Shadowing

You can disable the shadowing using the `skinparam shadowing false` command.

```
@startuml

left to right direction

skinparam shadowing<<no_shadow>> false
skinparam shadowing<<with_shadow>> true

actor User
(Glowing use case) <<with_shadow>> as guc
(Flat use case) <<no_shadow>> as fuc
User -- guc
User -- fuc

@enduml
```

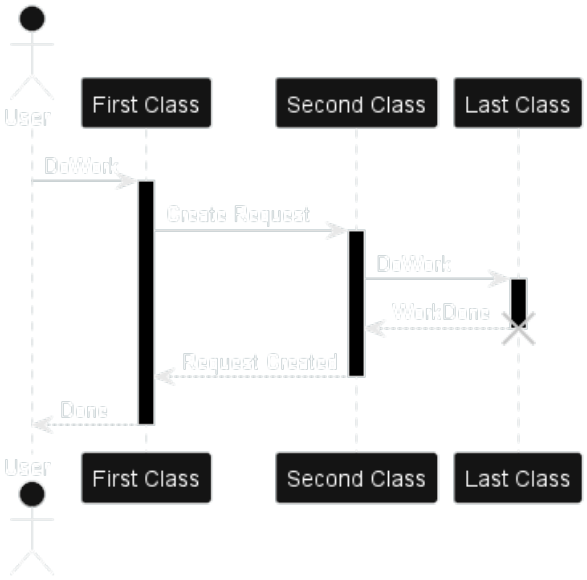


24.5 Reverse colors

You can force the use of a black&white output using `skinparam monochrome reverse` command. This can be useful for black background environment.

```
@startuml

skinparam monochrome reverse
```

```
actor User
participant "First Class" as A
participant "Second Class" as B
participant "Last Class" as C

User -> A: DoWork
activate A

A -> B: Create Request
activate B

B -> C: DoWork
activate C
C --> B: WorkDone
destroy C

B --> A: Request Created
deactivate B

A --> User: Done
deactivate A

@enduml
```



24.6 Colors

You can use either standard color name or RGB code.

```
@startuml
colors
@enduml
```

APPLICATION	Crimson	DeepPink	Indigo	LightYellow	Navy	RoyalBlue	Turquoise
AliceBlue	Cyan	DeepSkyBlue	Ivory	Lime	OldLace	STRATEGY	Violet
AntiqueWhite	DarkBlue	DimGray	Khaki	LimeGreen	Olive	SaddleBrown	Wheat
Aqua	DarkCyan	DimGrey	Lavender	Linen	OliveDrab	Salmon	White
Aquamarine	DarkGoldenRod	DodgerBlue	LavenderBlush	MOTIVATION	Orange	SandyBrown	WhiteSmoke
Azure	DarkGray	FireBrick	LawnGreen	Magenta	OrangeRed	SeaGreen	Yellow
BUSINESS	DarkGreen	FloralWhite	LemonChiffon	Maroon	Orchid	SeaShell	YellowGreen
Beige	DarkGrey	ForestGreen	LightBlue	MediumAquaMarine	PHYSICAL	Sienna	
Bisque	DarkKhaki	Fuchsia	LightCoral	MediumBlue	PaleGoldenRod	Silver	
Black	DarkMagenta	Gainsboro	LightCyan	MediumOrchid	PaleGreen	SkyBlue	
BlanchedAlmond	DarkOliveGreen	GhostWhite	LightGoldenRodYellow	MediumPurple	PaleTurquoise	SlateBlue	
Blue	DarkOrchid	Gold	LightGray	MediumSeaGreen	PaleVioletRed	SlateGray	
BlueViolet	DarkRed	GoldenRod	LightGreen	MediumSlateBlue	PapayaWhip	SlateGrey	
Brown	DarkSalmon	Gray	LightGrey	MediumSpringGreen	PeachPuff	Snow	
BurlyWood	DarkSeaGreen	Green	LightPink	MediumTurquoise	Peru	SpringGreen	
CadetBlue	DarkSlateBlue	GreenYellow	LightSalmon	MediumVioletRed	Pink	SteelBlue	
Chartreuse	DarkSlateGray	Grey	LightSeaGreen	MidnightBlue	Plum	TECHNOLOGY	
Chocolate	DarkSlateGrey	HoneyDew	LightSkyBlue	MintCream	PowderBlue	Tan	
Coral	DarkTurquoise	HotPink	LightSlateGray	MistyRose	Purple	Teal	
CornflowerBlue	DarkViolet	IMPLEMENTATION	LightSlateGrey	Moccasin	Red	Thistle	
Cornsilk	Darkorange	IndianRed	LightSteelBlue	NavajoWhite	RosyBrown	Tomato	

`transparent` can only be used for background of the image.

24.7 Font color, name and size

You can change the font for the drawing using `xxxFontColor`, `xxxFontSize` and `xxxFontName` parameters.

Example:

```
skinparam classFontColor red
skinparam classFontSize 10
skinparam classFontName Aapex
```

You can also change the default font for all fonts using `skinparam defaultFontName`.

Example:

```
skinparam defaultFontName Aapex
```

Please note the fontname is highly system dependent, so do not over use it, if you look for portability. `Helvetica` and `Courier` should be available on all systems.

A lot of parameters are available. You can list them using the following command:

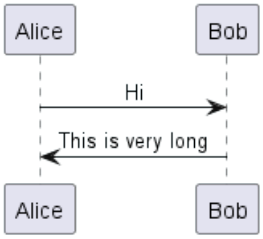
```
java -jar plantuml.jar -language
```

24.8 Text Alignment

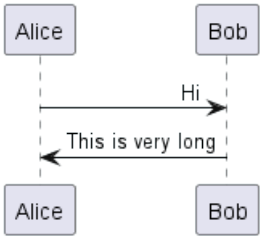
Text alignment can be set to `left`, `right` or `center` in `skinparam sequenceMessageAlign`. You can also use `direction` or `reverseDirection` values to align text depending on arrow direction.

Param name	Default value	Comment
sequenceMessageAlign	left	Used for messages in sequence diagrams
sequenceReferenceAlign	center	Used for `ref over` in sequence diagrams

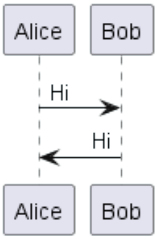
```
@startuml
skinparam sequenceMessageAlign center
Alice -> Bob : Hi
Bob -> Alice : This is very long
@enduml
```




```
@startuml
skinparam sequenceMessageAlign right
Alice -> Bob : Hi
Bob -> Alice : This is very long
@enduml
```



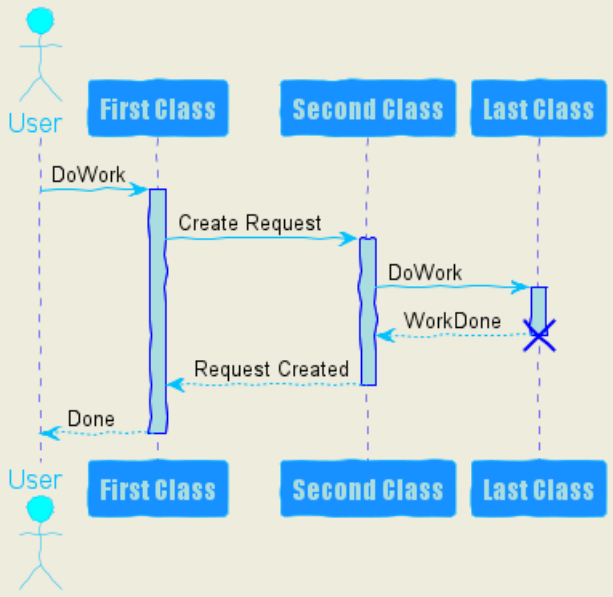

```
@startuml
skinparam sequenceMessageAlign direction
Alice -> Bob : Hi
Bob -> Alice: Hi
@enduml
```



24.9 Examples

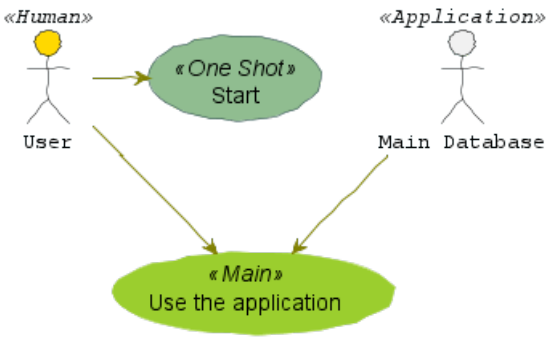
```
@startuml
skinparam backgroundColor #EEEBDC
skinparam handwritten true

skinparam sequence {
ArrowColor DeepSkyBlue
ActorBorderColor DeepSkyBlue
LifeLineBorderColor blue
LifeLineBackgroundColor #A9DCDF

ParticipantBorderColor DeepSkyBlue
ParticipantBackgroundColor DodgerBlue
ParticipantFontName Impact
ParticipantFontSize 17
ParticipantFontColor #A9DCDF

ActorBackgroundColor aqua
ActorFontColor DeepSkyBlue
ActorFontSize 17
ActorFontName Aapex
```

```
}

actor User
participant "First Class" as A
participant "Second Class" as B
participant "Last Class" as C

User -> A: DoWork
activate A

A -> B: Create Request
activate B

B -> C: DoWork
activate C
C --> B: WorkDone
destroy C

B --> A: Request Created
deactivate B

A --> User: Done
deactivate A
@enduml
```

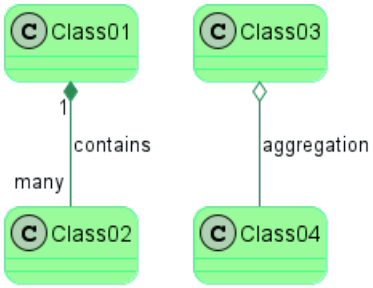



```
@startuml
skinparam handwritten true

skinparam actor {
BorderColor black
FontName Courier
        BackgroundColor<< Human >> Gold
}

skinparam usecase {
BackgroundColor DarkSeaGreen
BorderColor DarkSlateGray

BackgroundColor<< Main >> YellowGreen
```

```
BorderColor<< Main >> YellowGreen

ArrowColor Olive
}

User << Human >>
:Main Database: as MySql << Application >>
(Start) << One Shot >>
(Use the application) as (Use) << Main >>

User -> (Start)
User --> (Use)

MySql --> (Use)
@enduml
```

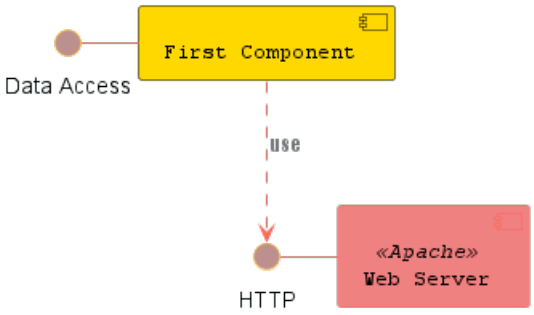



```
@startuml
skinparam roundcorner 20
skinparam class {
BackgroundColor PaleGreen
ArrowColor SeaGreen
BorderColor SpringGreen
}
skinparam stereotypeCBackgroundColor YellowGreen

Class01 "1" *-- "many" Class02 : contains

Class03 o-- Class04 : aggregation
@enduml
```

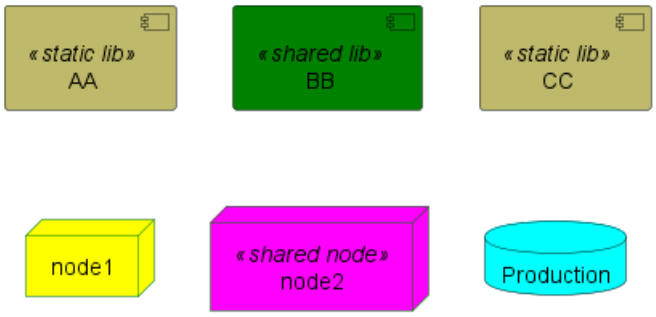



```
@startuml
skinparam interface {
  backgroundColor RosyBrown
  borderColor orange
}

skinparam component {
  FontSize 13
```

```
  BackgroundColor<<Apache>> LightCoral
  BorderColor<<Apache>> #FF6655
  FontName Courier
  BorderColor black
  BackgroundColor gold
  ArrowFontName Impact
  ArrowColor #FF6655
  ArrowFontColor #777777
}

() "Data Access" as DA
[Web Server] << Apache >>

DA - [First Component]
[First Component] ..> () HTTP : use
HTTP - [Web Server]
@enduml
```




```
@startuml
[AA] <<static lib>>
[BB] <<shared lib>>
[CC] <<static lib>>

node node1
node node2 <<shared node>>
database Production

skinparam component {
    backgroundColor<<static lib>> DarkKhaki
    backgroundColor<<shared lib>> Green
}

skinparam node {
borderColor Green
backgroundColor Yellow
backgroundColor<<shared node>> Magenta
}
skinparam databaseBackgroundColor Aqua
@enduml
```



24.10 List of all skinparam parameters

You can use `-language` on the command line or generate a "diagram" with a list of all the skinparam parameters using :

- `help skinparams`
- `skinparameters`

24.10.1 Command Line: -language command

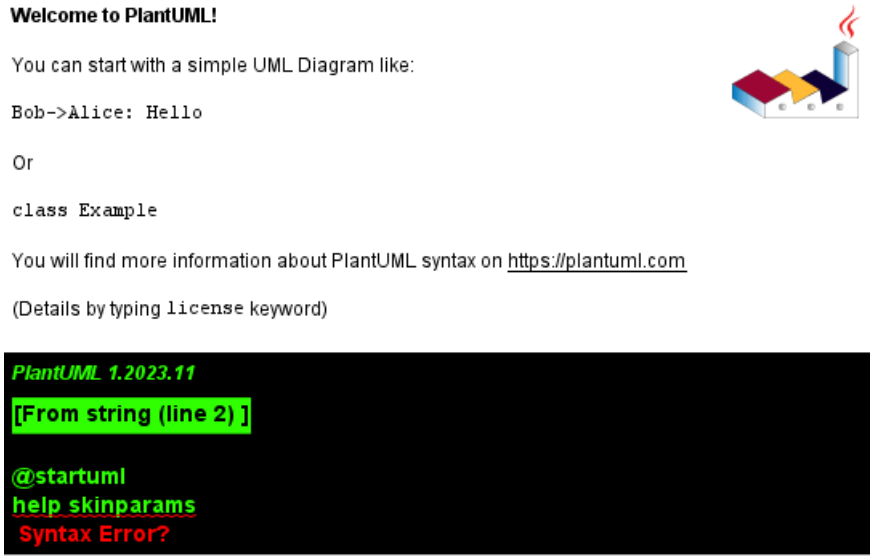
Since the documentation is not always up to date, you can have the complete list of parameters using this command:

```
java -jar plantuml.jar -language
```

24.10.2 Command: help skinparams

That will give you the following result, from this page *(code of this command)*: CommandHelpSkinparam.java

```
@startuml
help skinparams
@enduml
```



24.10.3 Command: skinparameters

```
@startuml
skinparameters
@enduml
```

ActivityBackgroundColor
ActivityBorderColor
ActivityBorderThickness
ActivityDiamondFontColor
ActivityDiamondFontName
ActivityDiamondFontSize
ActivityDiamondFontStyle
ActivityFontColor
ActivityFontName
ActivityFontSize
ActivityFontStyle
ActorBackgroundColor
ActorBorderColor
ActorFontColor
ActorFontName
ActorFontSize
ActorFontStyle
ActorStereotypeFontColor
ActorStereotypeFontName
ActorStereotypeFontSize
ActorStereotypeFontStyle
AgentBorderThickness
AgentFontColor
AgentFontName
AgentFontSize
AgentFontStyle
AgentStereotypeFontColor
AgentStereotypeFontName
AgentStereotypeFontSize
AgentStereotypeFontStyle
ArchimateBorderThickness
ArchimateFontColor
ArchimateFontName
ArchimateFontSize
ArchimateFontStyle
ArchimateStereotypeFontColor
ArchimateStereotypeFontName
ArchimateStereotypeFontSize
ArchimateStereotypeFontStyle
ArrowFontColor
ArrowFontName
ArrowFontSize
ArrowFontStyle
ArrowHeadColor
ArrowLollipopColor
ArrowMessageAlignment
ArrowThickness
ArtifactFontColor
ArtifactFontName
ArtifactFontSize
ArtifactFontStyle
ArtifactStereotypeFontColor
ArtifactStereotypeFontName
ArtifactStereotypeFontSize
ArtifactStereotypeFontStyle
BackgroundColor
BiddableBackgroundColor
BiddableBorderColor
BoundaryFontColor
BoundaryFontName
BoundaryFontSize
BoundaryFontStyle
BoundaryStereotypeFontColor
BoundaryStereotypeFontName
BoundaryStereotypeFontSize
BoundaryStereotypeFontStyle
BoxPadding
CaptionFontColor
CaptionFontName
CaptionFontSize
CaptionFontStyle
CardBorderThickness
CardFontColor
CardFontName
CardFontSize
CardFontStyle
CardStereotypeFontColor
CardStereotypeFontName
CardStereotypeFontSize
CardStereotypeFontStyle
CircledCharacterFontColor
CircledCharacterFontName
CircledCharacterFontSize
CircledCharacterFontStyle
CircledCharacterRadius
ClassAttributeFontColor
ClassAttributeFontName
ClassAttributeFontSize
ClassAttributeFontStyle
ClassAttributeIconSize
ClassBackgroundColor
ClassBorderColor
ClassBorderThickness
ClassFontColor
ClassFontName
ClassFontSize
ClassFontStyle
ClassStereotypeFontColor
ClassStereotypeFontName
ClassStereotypeFontSize
ClassStereotypeFontStyle
CloudFontColor
CloudFontName
CloudFontSize
CloudFontStyle
CloudStereotypeFontColor
CloudStereotypeFontName
CloudStereotypeFontSize
CloudStereotypeFontStyle
ColorArrowSeparationSpace
ComponentBorderThickness
ComponentFontColor
ComponentFontName
ComponentFontSize
ComponentFontStyle
ComponentStereotypeFontColor
ComponentStereotypeFontName
ComponentStereotypeFontSize
ComponentStereotypeFontStyle
ComponentStyle
ConditionEndStyle
ConditionStyle
ControlFontColor
ControlFontName
ControlFontSize
ControlFontStyle
ControlStereotypeFontColor
ControlStereotypeFontName
ControlStereotypeFontSize
ControlStereotypeFontStyle
DatabaseFontColor
DatabaseFontName
DatabaseFontSize
DatabaseFontStyle
DatabaseStereotypeFontColor
DatabaseStereotypeFontName
DatabaseStereotypeFontSize
DatabaseStereotypeFontStyle
DefaultFontColor
DefaultFontName
DefaultFontSize
DefaultFontStyle
DefaultMonospacedFontName
DefaultTextAlignment
DesignedBackgroundColor
DesignedBorderColor
DesignedDomainBorderThickness
DesignedDomainFontColor
DesignedDomainFontName
DesignedDomainFontSize
DesignedDomainFontStyle
DesignedDomainStereotypeFontColor
DesignedDomainStereotypeFontName
DesignedDomainStereotypeFontSize
DesignedDomainStereotypeFontStyle
DiagramBorderColor
DiagramBorderThickness
DomainBackgroundColor
DomainBorderColor
DomainBorderThickness
DomainFontColor
DomainFontName
DomainFontSize
DomainFontStyle
DomainStereotypeFontColor
DomainStereotypeFontName
DomainStereotypeFontSize
DomainStereotypeFontStyle
Dpi
EntityFontColor
EntityFontName
EntityFontSize
EntityFontStyle
EntityStereotypeFontColor
EntityStereotypeFontName
EntityStereotypeFontSize
EntityStereotypeFontStyle
FileFontColor
FileFontName
FileFontSize
FileFontStyle
FileStereotypeFontColor
FileStereotypeFontName
FileStereotypeFontSize
FileStereotypeFontStyle
FixCircleLabelOverlapping
FolderFontColor
FolderFontName
FolderFontSize
FolderFontStyle
FolderStereotypeFontColor
FolderStereotypeFontName
FolderStereotypeFontSize
FolderStereotypeFontStyle
FooterFontColor
FooterFontName
FooterFontSize
FooterFontStyle
FrameFontColor
FrameFontName
FrameFontSize
FrameFontStyle
FrameStereotypeFontColor
FrameStereotypeFontName
FrameStereotypeFontSize
FrameStereotypeFontStyle
GenericDisplay
Guillemet
Handwritten
HeaderFontColor
HeaderFontName
HeaderFontSize
HeaderFontStyle
HexagonBorderThickness
HexagonFontColor
HexagonFontName
HexagonFontSize
HexagonFontStyle
HexagonStereotypeFontColor
HexagonStereotypeFontName
HexagonStereotypeFontSize
HexagonStereotypeFontStyle
HyperlinkColor
HyperlinkUnderline
IconIEMandatoryColor
IconPackageBackgroundColor
IconPackageColor
IconPrivateBackgroundColor
IconPrivateColor
IconProtectedBackgroundColor
IconProtectedColor
IconPublicBackgroundColor
IconPublicColor
InterfaceFontColor
InterfaceFontName
InterfaceFontSize
InterfaceFontStyle
InterfaceStereotypeFontColor
InterfaceStereotypeFontName
InterfaceStereotypeFontSize
InterfaceStereotypeFontStyle
LabelFontColor
LabelFontName
LabelFontSize
LabelFontStyle
LabelStereotypeFontColor
LabelStereotypeFontName
LabelStereotypeFontSize
LabelStereotypeFontStyle
LegendBorderThickness
LegendFontColor
LegendFontName
LegendFontSize
LegendFontStyle
LexicalBackgroundColor
LexicalBorderColor
LifelineStrategy
Linetype
MachineBackgroundColor
MachineBorderColor
MachineBorderThickness
MachineFontColor
MachineFontName
MachineFontSize
MachineFontStyle
MachineStereotypeFontColor
MachineStereotypeFontName
MachineStereotypeFontSize
MachineStereotypeFontStyle
MaxAsciiMessageLength
MaxMessageSize
MinClassWidth
Monochrome
NodeFontColor
NodeFontName
NodeFontSize
NodeFontStyle
NodeStereotypeFontColor
NodeStereotypeFontName
NodeStereotypeFontSize
NodeStereotypeFontStyle
Nodesep
NoteBackgroundColor
NoteBorderColor
NoteBorderThickness
NoteFontColor
NoteFontName
NoteFontSize
NoteFontStyle
NoteShadowing
NoteTextAlignment
ObjectAttributeFontColor
ObjectAttributeFontName
ObjectAttributeFontSize
ObjectAttributeFontStyle
ObjectBorderThickness
ObjectFontColor
ObjectFontName
ObjectFontSize
ObjectFontStyle
ObjectStereotypeFontColor
ObjectStereotypeFontName
ObjectStereotypeFontSize
ObjectStereotypeFontStyle
PackageBorderThickness
PackageFontColor
PackageFontName
PackageFontSize
PackageFontStyle
PackageStereotypeFontColor
PackageStereotypeFontName
PackageStereotypeFontSize
PackageStereotypeFontStyle
PackageStyle
PackageTitleAlignment
Padding
PageBorderColor
PageExternalColor
PageMargin
ParticipantFontColor
ParticipantFontName
ParticipantFontSize
ParticipantFontStyle
ParticipantPadding
ParticipantStereotypeFontColor
ParticipantStereotypeFontName
ParticipantStereotypeFontSize
ParticipantStereotypeFontStyle
PartitionBorderThickness
PartitionFontColor
PartitionFontName
PartitionFontSize
PartitionFontStyle
PathHoverColor
PersonBorderThickness
PersonFontColor
PersonFontName
PersonFontSize
PersonFontStyle
PersonStereotypeFontColor
PersonStereotypeFontName
PersonStereotypeFontSize
PersonStereotypeFontStyle
QueueBorderThickness
QueueFontColor
QueueFontName
QueueFontSize
QueueFontStyle
QueueStereotypeFontColor
QueueStereotypeFontName
QueueStereotypeFontSize
QueueStereotypeFontStyle
Ranksep
RectangleBorderThickness
RectangleFontColor
RectangleFontName
RectangleFontSize
RectangleFontStyle
RectangleStereotypeFontColor
RectangleStereotypeFontName
RectangleStereotypeFontSize
RectangleStereotypeFontStyle
RequirementBackgroundColor
RequirementBorderColor
RequirementBorderThickness
RequirementFontColor
RequirementFontName
RequirementFontSize
RequirementFontStyle
RequirementStereotypeFontColor
RequirementStereotypeFontName
RequirementStereotypeFontSize
RequirementStereotypeFontStyle
ResponseMessageBelowArrow
RoundCorner
SameClassWidth
SequenceActorBorderThickness
SequenceArrowThickness
SequenceBoxBorderColor
SequenceBoxFontColor
SequenceBoxFontName
SequenceBoxFontSize
SequenceBoxFontStyle
SequenceDelayFontColor
SequenceDelayFontName
SequenceDelayFontSize
SequenceDelayFontStyle
SequenceDividerBorderThickness
SequenceDividerFontColor
SequenceDividerFontName
SequenceDividerFontSize
SequenceDividerFontStyle
SequenceGroupBodyBackgroundColor
SequenceGroupBorderThickness
SequenceGroupFontColor
SequenceGroupFontName
SequenceGroupFontSize
SequenceGroupFontStyle
SequenceGroupHeaderFontColor
SequenceGroupHeaderFontName
SequenceGroupHeaderFontSize
SequenceGroupHeaderFontStyle
SequenceLifeLineBorderColor
SequenceLifeLineBorderThickness
SequenceMessageAlignment
SequenceMessageTextAlignment
SequenceNewpageSeparatorColor
SequenceParticipant
SequenceParticipantBorderThickness
SequenceReferenceAlignment
SequenceReferenceBackgroundColor
SequenceReferenceBorderThickness
SequenceReferenceFontColor
SequenceReferenceFontName
SequenceReferenceFontSize
SequenceReferenceFontStyle
SequenceReferenceHeaderBackgroundColor
SequenceStereotypeFontColor
SequenceStereotypeFontName
SequenceStereotypeFontSize
SequenceStereotypeFontStyle
Shadowing
StackFontColor
StackFontName
StackFontSize
StackFontStyle
StackStereotypeFontColor
StackStereotypeFontName
StackStereotypeFontSize
StackStereotypeFontStyle
StateAttributeFontColor
StateAttributeFontName
StateAttributeFontSize
StateAttributeFontStyle
StateBorderColor
StateFontColor
StateFontName
StateFontSize
StateFontStyle
StateMessageAlignment
StereotypePosition
StorageFontColor
StorageFontName
StorageFontSize
StorageFontStyle
StorageStereotypeFontColor
StorageStereotypeFontName
StorageStereotypeFontSize
StorageStereotypeFontStyle
Style
SvglinkTarget
SwimlaneBorderThickness
SwimlaneTitleFontColor
SwimlaneTitleFontName
SwimlaneTitleFontSize
SwimlaneTitleFontStyle
SwimlaneWidth
SwimlaneWrapTitleWidth
TabSize
TimingFontColor
TimingFontName
TimingFontSize
TimingFontStyle
TitleBorderRoundCorner
TitleBorderThickness
TitleFontColor
TitleFontName
TitleFontSize
TitleFontStyle
UsecaseBorderThickness
UsecaseFontColor
UsecaseFontName
UsecaseFontSize
UsecaseFontStyle
UsecaseStereotypeFontColor
UsecaseStereotypeFontName
UsecaseStereotypeFontSize
UsecaseStereotypeFontStyle
WrapWidth

24.10.4 All Skin Parameters on the Ashley's PlantUML Doc

You can also view each skinparam parameters with its results displayed at the page `All Skin Parameters` of `Ashley's PlantUML Doc`:

- https://plantuml-documentation.readthedocs.io/en/latest/formatting/all-skin-params.html.

25 Preprocessing

Some preprocessing capabilities are included in **PlantUML**, and available for *all* diagrams.

Those functionalities are very similar to the C language preprocessor, except that the special character `#` has been changed to the exclamation mark `!`.

25.1 Variable definition [=, ?=]

Although this is not mandatory, we highly suggest that variable names start with a `$`.

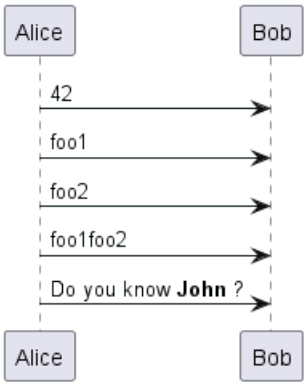
There are three types of data:

- **Integer number** *(int)*;
- **String** *(str)* - these must be surrounded by single quote or double quote;
- **JSON** (JSON) - these must be surrounded by curly brackets.

(for JSON variable definition and usage, see more details on Preprocessing-JSON page)

Variables created outside function are **global**, that is you can access them from everywhere (including from functions). You can emphasize this by using the optional `global` keyword when defining a variable.

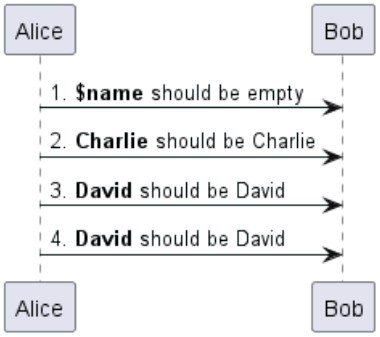
```
@startuml
!$a  = 42
!$ab = "foo1"
!$cd = "foo2"
!$ef = $ab + $cd
!$foo = { "name": "John", "age" : 30 }

Alice -> Bob : $a
Alice -> Bob : $ab
Alice -> Bob : $cd
Alice -> Bob : $ef
Alice -> Bob : Do you know **$foo.name** ?
@enduml
```



You can also assign a value to a variable, only if it is not already defined, with the syntax: `!$a ?= "foo"`

```
@startuml
Alice -> Bob : 1. **$name** should be empty

!$name ?= "Charlie"
Alice -> Bob : 2. **$name** should be Charlie

!$name = "David"
Alice -> Bob : 3. **$name** should be David

!$name ?= "Ethan"
Alice -> Bob : 4. **$name** should be David
```

```
@enduml
```



25.2 Boolean expression

25.2.1 Boolean representation [0 is false]

There is not real boolean type, but PlantUML use this integer convention:

- Integer `0` means `false`
- and any non-null number (as `1`) or any string (as `"1"`, or even `"0"`) means `true`.

[Ref. QA-9702]

25.2.2 Boolean operation and operator [&&, ||, ()]

You can use boolean expression, in the test, with :

- *parenthesis* `()`;
- *and operator* `&&`;
- *or operator* `||`.

(See next example, within `if` test.)

25.2.3 Boolean builtin functions [%false(), %true(), %not(<exp>)]

For convenience, you can use those boolean builtin functions:

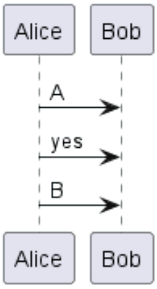
- `%false()`
- `%true()`
- `%not(<exp>)`

[See also Builtin functions]

25.3 Conditions [!if, !else, !elseif, !endif]

- You can use expression in condition.
- *else* and *elseif* are also implemented

```
@startuml
!$a = 10
!$ijk = "foo"
Alice -> Bob : A
!if ($ijk == "foo") && ($a+10>=4)
Alice -> Bob : yes
!else
Alice -> Bob : This should not appear
!endif
Alice -> Bob : B
@enduml
```

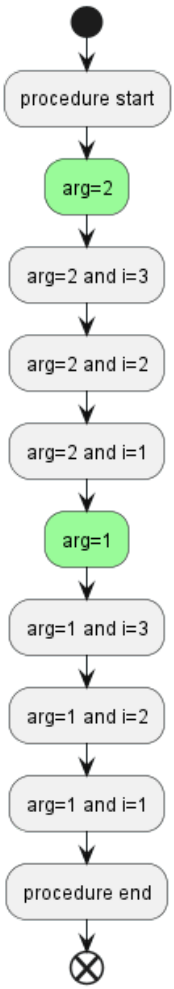


25.4 While loop [!while, !endwhile]

You can use `!while` and `!endwhile` keywords to have repeat loops.

25.4.1 While loop (on Activity diagram)

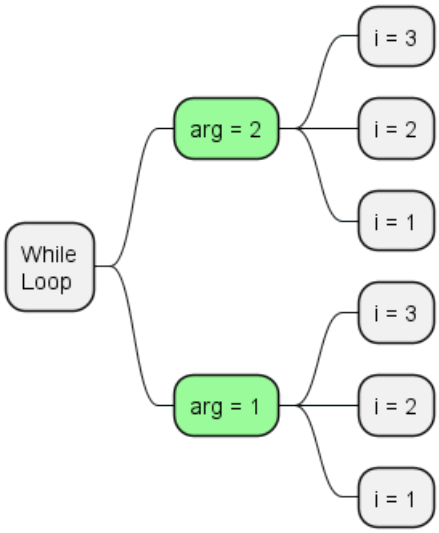
```
@startuml
!procedure $foo($arg)
  :procedure start;
  !while $arg!=0
    !$i=3
    #palegreen:arg=$arg;
    !while $i!=0
      :arg=$arg and i=$i;
      !$i = $i - 1
    !endwhile
    !$arg = $arg - 1
  !endwhile
  :procedure end;
!endprocedure

start
$foo(2)
end
@enduml
```



[Adapted from QA-10838]

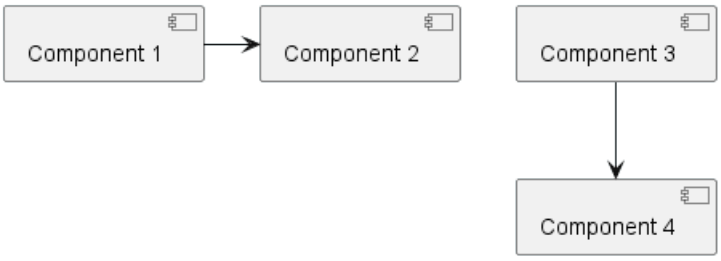
25.4.2 While loop (on Mindmap diagram)

```
@startmindmap
!procedure $foo($arg)
  !while $arg!=0
    !$i=3
    **[#palegreen] arg = $arg
    !while $i!=0
      *** i = $i
      !$i = $i - 1
    !endwhile
    !$arg = $arg - 1
  !endwhile
!endprocedure

*:While
Loop;
$foo(2)
@endmindmap
```



25.4.3 While loop (on Component/Deployment diagram)

```
@startuml
!procedure $foo($arg)
  !while $arg!=0
    [Component $arg] as $arg
    !$arg = $arg - 1
  !endwhile
!endprocedure

$foo(4)

1->2
3-->4
@enduml
```



[Ref. QA-14088]

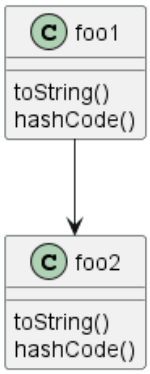
25.5 Procedure [!procedure, !endprocedure]

- Procedure names *should* start with a `$`
- Argument names *should* start with a `$`
- Procedures can call other procedures

Example:

```
@startuml
!procedure $msg($source, $destination)
  $source --> $destination
!endprocedure
```

```
!procedure $init_class($name)
  class $name {
    $addCommonMethod()
  }
!endprocedure


!procedure $addCommonMethod()
  toString()
  hashCode()
!endprocedure


$init_class("foo1")
$init_class("foo2")
$msg("foo1", "foo2")
@enduml
```



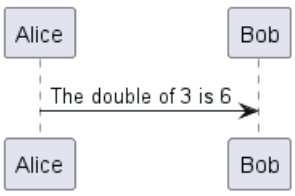
Variables defined in procedures are **local**. It means that the variable is destroyed when the procedure ends.

25.6 Return function [!function, !endfunction]

A return function does not output any text. It just define a function that you can call:

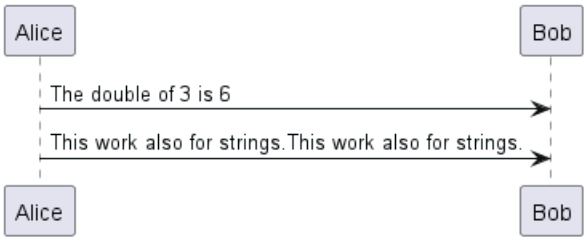
- directly in variable definition or in diagram text
- from other return functions
- from procedures
- Function name *should* start with a `$`
- Argument names *should* start with a `$`

```
@startuml
!function $double($a)
!return $a + $a
!endfunction

Alice -> Bob : The double of 3 is $double(3)
@enduml
```



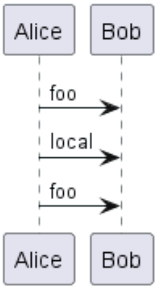
It is possible to shorten simple function definition in one line:

```
@startuml
!function $double($a) !return $a + $a

Alice -> Bob : The double of 3 is $double(3)
Alice -> Bob : $double("This work also for strings.")
@enduml
```



As in procedure (void function), variable are local by default (they are destroyed when the function is exited). However, you can access to global variables from function. However, you can use the `local` keyword to create a local variable if ever a global variable exists with the same name.

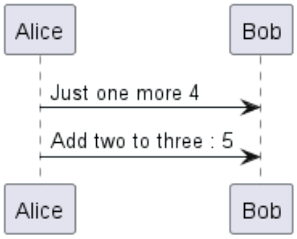
```
@startuml
!function $dummy()
!local $ijk = "local"
!return "Alice -> Bob : " + $ijk
!endfunction

!global $ijk = "foo"

Alice -> Bob : $ijk
$dummy()
Alice -> Bob : $ijk
@enduml
```



25.7 Default argument value

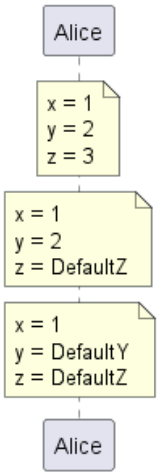
In both procedure and return functions, you can define default values for arguments.

```
@startuml
!function $inc($value, $step=1)
!return $value + $step
!endfunction

Alice -> Bob : Just one more $inc(3)
Alice -> Bob : Add two to three : $inc(3, 2)
@enduml
```



Only arguments at the end of the parameter list can have default values.

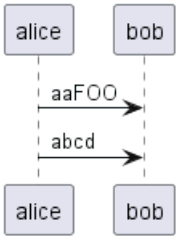
```
@startuml
!procedure defaulttest($x, $y="DefaultY", $z="DefaultZ")
note over Alice
  x = $x
  y = $y
  z = $z
end note
!endprocedure

defaulttest(1, 2, 3)
defaulttest(1, 2)
defaulttest(1)
@enduml
```



25.8 Unquoted procedure or function [!unquoted]

By default, you have to put quotes when you call a function or a procedure. It is possible to use the `unquoted` keyword to indicate that a function or a procedure does not require quotes for its arguments.

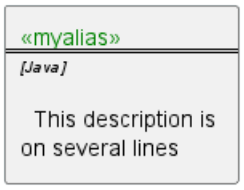
```
@startuml
!unquoted function id($text1, $text2="FOO") !return $text1 + $text2

alice -> bob : id(aa)
alice -> bob : id(ab,cd)
@enduml
```



25.9 Keywords arguments

Like in Python, you can use keywords arguments :

```
@startuml

!unquoted procedure $element($alias, $description="", $label="", $technology="", $size=12, $colour="
rectangle $alias as "
<color:$colour><<$alias>></color>
==$label==
//<size:$size>[$technology]</size>//

  $description"
!endprocedure

$element(myalias, "This description is %newline()on several lines", $size=10, $technology="Java")
@enduml
```

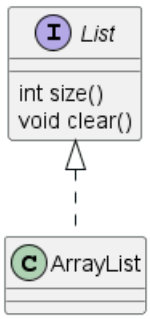


25.10 Including files or URL [!include, !include_many, !include_once]

Use the `!include` directive to include file in your diagram. Using URL, you can also include file from Internet/Intranet. Protected Internet resources can also be accessed, this is described in URL authentication.

Imagine you have the very same class that appears in many diagrams. Instead of duplicating the description of this class, you can define a file that contains the description.

```
@startuml

interface List
List : int size()
List : void clear()
List <|.. ArrayList
@enduml
```



File List.iuml

```
interface List
List : int size()
List : void clear()
```

The file `List.iuml` can be included in many diagrams, and any modification in this file will change all diagrams that include it.

You can also put several `@startuml/@enduml` text block in an included file and then specify which block you want to include adding `!0` where `0` is the block number. The `!0` notation denotes the first diagram.

For example, if you use `!include foo.txt!1`, the second `@startuml/@enduml` block within `foo.txt` will be included.

You can also put an id to some `@startuml/@enduml` text block in an included file using `@startuml(id=MY_OWN_ID)` syntax and then include the block adding `!MY_OWN_ID` when including the file, so using something like `!include foo.txt!MY_OWN_ID`.

By default, a file can only be included once. You can use `!include_many` instead of `!include` if you want to include some file several times. Note that there is also a `!include_once` directive that raises an error if a file is included several times.

25.11 Including Subpart [!startsub, !endsub, !includesub]

You can also use `!startsub NAME` and `!endsub` to indicate sections of text to include from other files using `!includesub`. For example:

file1.puml:

```
@startuml

A -> A : stuff1
!startsub BASIC
B -> B : stuff2
!endsub
C -> C : stuff3
!startsub BASIC
D -> D : stuff4
!endsub
@enduml
```

file1.puml would be rendered exactly as if it were:

```
@startuml

A -> A : stuff1
B -> B : stuff2
C -> C : stuff3
D -> D : stuff4
@enduml
```

However, this would also allow you to have another file2.puml like this:

file2.puml

```
@startuml

title this contains only B and D
!includesub file1.puml!BASIC
@enduml
```

This file would be rendered exactly as if:

```
@startuml

title this contains only B and D
B -> B : stuff2
D -> D : stuff4
@enduml
```

25.12 Builtin functions [%]

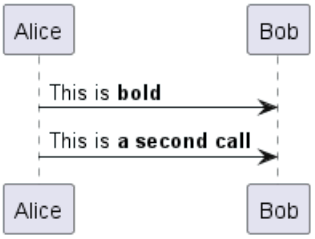
Some functions are defined by default. Their name starts by `%`

Name	Description
%chr	Return a character from a give Unicode value
%darken	Return a darken color of a given color with some ratio
%date	Retrieve current date. You can provide an optional format for the date
	You can provide another optional time (on epoch format)
%dec2hex	Return the hexadecimal string (String) of a decimal value (Int)
%dirpath	Retrieve current dirpath
%feature	Check if some feature is available in the current PlantUML running version
%false	Return always `false`
%file_exists	Check if a file exists on the local filesystem
%filename	Retrieve current filename
%function_exists	Check if a function exists
%get_variable_value	Retrieve some variable value
%getenv	Retrieve environment variable value
%hex2dec	Return the decimal value (Int) of a hexadecimal string (String)
%hsl_color	Return the RGBa color from a HSL color `%hsl_color(h, s, l)` or `%hsl_color(h, s, l,`
%intval	Convert a String to Int
%is_dark	Check if a color is a dark one
%is_light	Check if a color is a light one
%lighten	Return a lighten color of a given color with some ratio
%load_json	Load JSON data from local file or external URL
%lower	Return a lowercase string
%newline	Return a newline
%not	Return the logical negation of an expression
%now	Return the current epoch time
%ord	Return a Unicode value from a given character
%lighten	Return a lighten color of a given color with some ratio
%reverse_color	Reverse a color using RGB
%reverse_hsluv_color	Reverse a color using HSLuv
%set_variable_value	Set a global variable
%size	Return the size of any string or JSON structure
%string	Convert an expression to String
%strlen	Calculate the length of a String
%strpos	Search a substring in a string
%substr	Extract a substring. Takes 2 or 3 arguments
%true	Return always `true`
%upper	Return an uppercase string
%variable_exists	Check if a variable exists
%version	Return PlantUML current version

25.13 Logging [!log]

You can use `!log` to add some log output when generating the diagram. This has no impact at all on the diagram itself. However, those logs are printed in the command line's output stream. This could be useful for debug purpose.

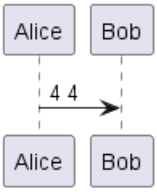
```
@startuml
!function bold($text)
!$result = "<b>"+ $text +"</b>"
!log Calling bold function with $text. The result is $result
!return $result
!endfunction

Alice -> Bob : This is bold("bold")
Alice -> Bob : This is bold("a second call")
@enduml
```



25.14 Memory dump [!dump_memory]

You can use `!dump_memory` to dump the full content of the memory when generating the diagram. An optional string can be put after `!dump_memory`. This has no impact at all on the diagram itself. This could be useful for debug purpose.

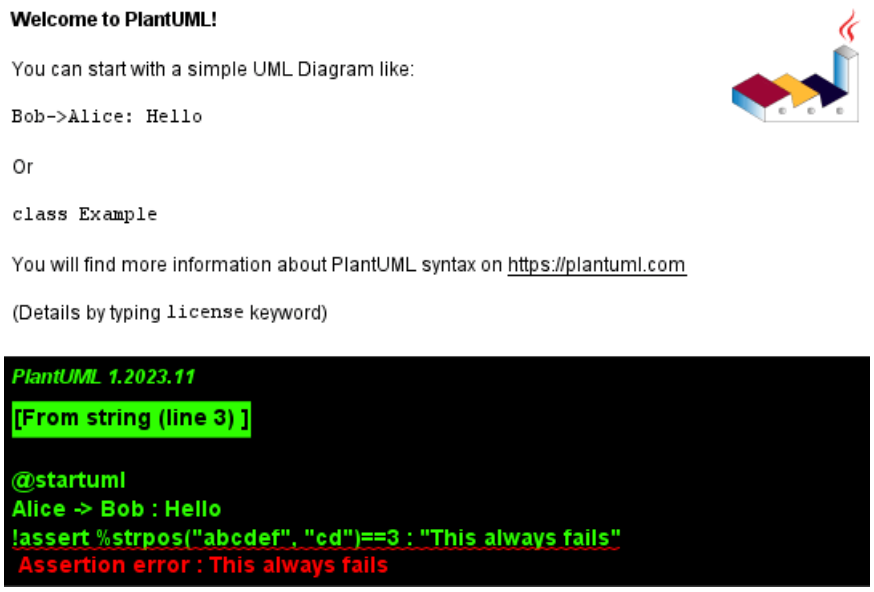
```
@startuml
!function $inc($string)
!$val = %intval($string)
!log value is $val
!dump_memory
!return $val+1
!endfunction

Alice -> Bob : 4 $inc("3")
!unused = "foo"
!dump_memory EOF
@enduml
```



25.15 Assertion [!assert]

You can put assertions in your diagram.

```
@startuml
Alice -> Bob : Hello
!assert %strpos("abcdef", "cd")==3 : "This always fails"
@enduml
```



25.16 Building custom library [!import, !include]

It's possible to package a set of included files into a single .zip or .jar archive. This single zip/jar can then be imported into your diagram using `!import` directive.

Once the library has been imported, you can `!include` file from this single zip/jar.

Example:

```
@startuml

!import /path/to/customLibrary.zip
' This just adds "customLibrary.zip" in the search path

!include myFolder/myFile.iuml
' Assuming that myFolder/myFile.iuml is located somewhere
' either inside "customLibrary.zip" or on the local filesystem

...
```

25.17 Search path

You can specify the java property `plantuml.include.path` in the command line.

For example:

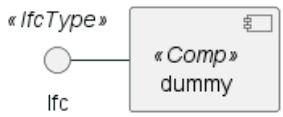
```
java -Dplantuml.include.path="c:/mydir" -jar plantuml.jar atest1.txt
```

Note the this -D option has to put before the -jar option. -D options after the -jar option will be used to define constants within plantuml preprocessor.

25.18 Argument concatenation [##]

It is possible to append text to a macro argument using the `##` syntax.

```
@startuml
!unquoted procedure COMP_TEXTGENCOMP(name)
[name] << Comp >>
interface Ifc << IfcType >> AS name##Ifc
name##Ifc - [name]
!endprocedure
COMP_TEXTGENCOMP(dummy)
@enduml
```

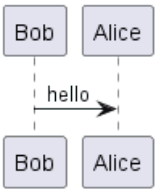


25.19 Dynamic invocation [%invoke_procedure(), %call_user_func()]

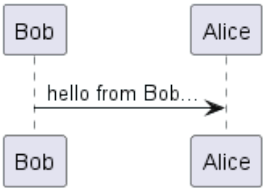
You can dynamically invoke a procedure using the special `%invoke_procedure()` procedure. This procedure takes as first argument the name of the actual procedure to be called. The optional following arguments are copied to the called procedure.

For example, you can have:

```
@startuml
!procedure $go()
  Bob -> Alice : hello
!endprocedure

!$wrapper = "$go"

%invoke_procedure($wrapper)
@enduml
```

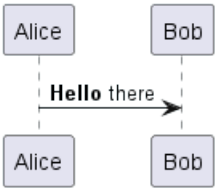



```
@startuml
!procedure $go($txt)
  Bob -> Alice : $txt
!endprocedure

%invoke_procedure("$go", "hello from Bob...")
@enduml
```



For return functions, you can use the corresponding special function `%call_user_func()` :

```
@startuml
!function bold($text)
!return "<b>"+ $text +"</b>"
!endfunction

Alice -> Bob : %call_user_func("bold", "Hello") there
@enduml
```



25.20 Evaluation of addition depending of data types [+]

Evaluation of `$a + $b` depending of type of `$a` or `$b`

```
@startuml
title
<#LightBlue>|= |=  $a |=  $b |=  <U+0025>string($a + $b)|
<#LightGray>| type | str | str | str (concatenation) |
| example |= "a" |= "b" |= %string("a" + "b") |
<#LightGray>| type | str | int | str (concatenation) |
| ex.|= "a" |=  2  |= %string("a" + 2)   |
<#LightGray>| type | str | int | str (concatenation) |
| ex.|=  1  |= "b" |= %string(1 + "b")   |
<#LightGray>| type | bool | str | str (concatenation) |
| ex.|= <U+0025>true() |= "b" |= %string(%true() + "b") |
<#LightGray>| type | str | bool | str (concatenation) |
| ex.|= "a" |= <U+0025>false() |= %string("a" + %false()) |
<#LightGray>| type |  int  |  int | int (addition of int) |
| ex.|=  1  |=  2  |= %string(1 + 2)     |
<#LightGray>| type |  bool  |  int | int (addition) |
| ex.|= <U+0025>true() |= 2 |= %string(%true() + 2) |
<#LightGray>| type |  int  |  bool | int (addition) |
| ex.|=  1  |= <U+0025>false() |= %string(1 + %false()) |
<#LightGray>| type |  int  |  int | int (addition) |
| ex.|=  1  |=  <U+0025>intval("2")  |= %string(1 + %intval("2")) |
end title
@enduml
```

	$a	$b	%string($a + $b)
type	str	str	str (concatenation)
example	"a"	"b"	ab
type	str	int	str (concatenation)
ex.	"a"	2	a2
type	str	int	str (concatenation)
ex.	1	"b"	1b
type	bool	str	str (concatenation)
ex.	%true()	"b"	1b
type	str	bool	str (concatenation)
ex.	"a"	%false()	a0
type	int	int	int (addition of int)
ex.	1	2	3
type	bool	int	int (addition)
ex.	%true()	2	3
type	int	bool	int (addition)
ex.	1	%false()	1
type	int	int	int (addition)
ex.	1	%intval("2")	3

25.21 Preprocessing JSON

You can extend the functionality of the current Preprocessing with JSON Preprocessing features:

- JSON Variable definition
- Access to JSON data
- Loop over JSON array

(See more details on Preprocessing-JSON page)

25.22 Including theme [!theme]

Use the `!theme` directive to change the default theme of your diagram.

```
@startuml
!theme spacelab
class Example {
  Theme spacelab
}
@enduml
```

You will find more information on the dedicated page.

25.23 Migration notes

The current preprocessor is an update from some legacy preprocessor.

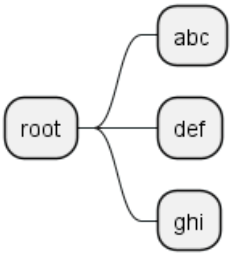
Even if some legacy features are still supported with the actual preprocessor, you should not use them any more (they might be removed in some long term future).

- You should not use `!define` and `!definelong` anymore. Use `!function`, `!procedure` or variable definition instead.
  - `!define` should be replaced by return `!function`
  - `!definelong` should be replaced by `!procedure`.
- `!include` now allows multiple inclusions : you don't have to use `!include_many` anymore
- `!include` now accepts a URL, so you don't need `!includeurl`
- Some features (like `%date%`) have been replaced by builtin functions (for example `%date()`)
- When calling a legacy `!definelong` macro with no arguments, you do have to use parenthesis. You have to use `my_own_definelong()` because `my_own_definelong` without parenthesis is not recognized by the new preprocessor.

Please contact us if you have any issues.

25.24 %Splitstr builtin function

```
@startmindmap
!$list = %splitstr("abc~def~ghi", "~")

* root
!foreach $item in $list
  ** $item
!endfor
@endmindmap
```



[Ref. QA-15374]

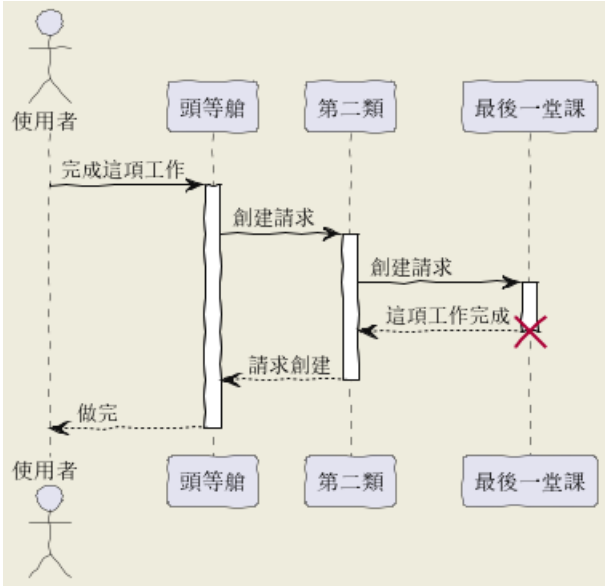
26 Unicode

The PlantUML language use *letters* to define actor, usecase and so on.

But *letters* are not only A-Z latin characters, it could be *any kind of letter from any language*.

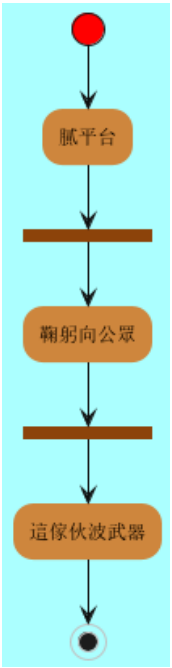
26.1 Examples

```
@startuml
skinparam handwritten true
skinparam backgroundColor #EEEBDC

actor 使用者
participant "頭等艙" as A
participant "第二類" as B
participant "最後一堂課" as 別的東西

使用者 -> A: 完成這項工作
activate A

A -> B: 創建請求
activate B

B -> 別的東西: 創建請求
activate 別的東西
別的東西 --> B: 這項工作完成
destroy 別的東西

B --> A: 請求創建
deactivate B

A --> 使用者: 做完
deactivate A
@enduml
```

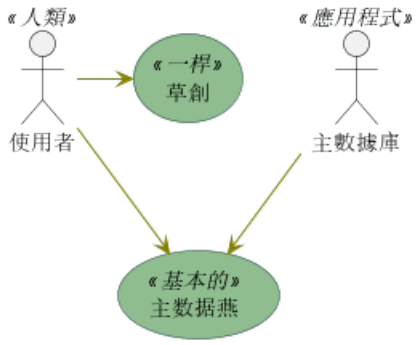



```
@startuml

(*) --> "膩平台"
--> === S1 ===
--> 鞠躬向公眾
--> === S2 ===
```

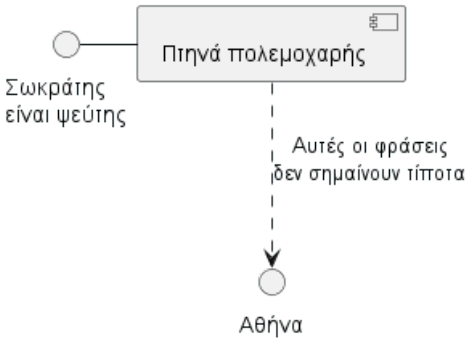
```
--> 這傢伙波武器
--> (*)

skinparam backgroundColor #AAFFFF
skinparam activityStartColor red
skinparam activityBarColor SaddleBrown
skinparam activityEndColor Silver
skinparam activityBackgroundColor Peru
skinparam activityBorderColor Peru
@enduml
```




```
@startuml

skinparam usecaseBackgroundColor DarkSeaGreen
skinparam usecaseArrowColor Olive
skinparam actorBorderColor black
skinparam usecaseBorderColor DarkSlateGray

使用者 << 人類 >>
"主數據庫" as 數據庫 << 應用程式 >>
(草創) << 一桿 >>
"主数据燕" as (贏余) << 基本的 >>

使用者 -> (草創)
使用者 --> (贏余)

數據庫  --> (贏余)
@enduml
```




```
@startuml
() "Σ          " as Σ
Σ      - [Π          ]
[Π          ] ..> () A    : A
@enduml
```



26.2 Charset

The default charset used when *reading* the text files containing the UML text description is system dependent.

Normally, it should just be fine, but in some case, you may want to the use another charset. For example, with the command line:

```
java -jar plantuml.jar -charset UTF-8 files.txt
```

Or, with the ant task:

```
<!-- Put images in c:/images directory -->
<target name="main">
<plantuml dir="./src" charset="UTF-8" />
```

Depending of your Java installation, the following charset should be available: `ISO-8859-1`, `UTF-8`, `UTF-16BE`, `UTF-16LE`, `UTF-16`.

26.3 Using Unicode Character on PlantUML

On PlantUML diagram, you can integrate:

- Special characters using `&#XXXX;` or `<U+XXXX>` form;
- Emoji using `<:XXXXX:>` or `<:NameOfEmoji:>`form.

27 PlantUML Standard Library

Welcome to the guide on PlantUML's official **Standard Library** (`stdlib`). Here, we delve into this integral resource that is now included in all official releases of PlantUML, facilitating a richer diagram creation experience. The library borrows its file inclusion convention from the "C standard library", a well-established protocol in the programming world.

27.0.1 Standard Library Overview

The Standard Library is a repository of files and resources, constantly updated to enhance your PlantUML experience. It forms the backbone of PlantUML, offering a range of functionalities and features to explore.

27.0.2 Contribution from the Community

A significant portion of the library's contents are generously provided by third-party contributors. We extend our heartfelt gratitude to them for their invaluable contributions that have played a pivotal role in enriching the library.

We encourage users to delve into the abundant resources the Standard Library offers, to not only enhance their diagram crafting experience but also possibly contribute and be a part of this collaborative endeavor.

27.1 List of Standard Library

You can list standard library folders using the special diagram:

```
@startuml
stdlib
@enduml
```

archimate
Version 1.1.0
Delivered by https://github.com/plantuml-stdlib/Archimate-PlantUML

aws
Version 18.02.22
Delivered by https://github.com/milo-minderbinder/AWS-PlantUML

awslib
Version 14.0.0
Delivered by https://github.com/awslabs/aws-icons-for-plantuml

azure
Version 2.2.0
Delivered by https://github.com/plantuml-stdlib/Azure-PlantUML

c4
Version 2.8.0
Delivered by https://github.com/plantuml-stdlib/C4-PlantUML

classy
Version 1.0.0
Delivered by https://github.com/james-gadrow-kr/classy-plantuml

classy-c4
Version 1.0.0
Delivered by https://github.com/james-gadrow-kr/classy-c4

cloudinsight
Version 1.0.0
Delivered by https://github.com/plantuml-stdlib/cicon-plantuml-sprites

cloudogu
Version 1.0.2
Delivered by https://github.com/cloudogu/plantuml-cloudogu-sprites

domainstory
Version 0.3
Delivered by https://github.com/johthor/DomainStory-PlantUML

elastic
Version 0.0.1
Delivered by https://github.com/Crashedmind/PlantUML-Elastic-icons

kubernetes
Version 5.3.45
Delivered by https://github.com/plantuml-stdlib/plantuml-kubernetes-sprites

logos
Version 1.1.0
Delivered by https://github.com/plantuml-stdlib/gilbarbara-plantuml-sprites

material
Version 0.0.1
Delivered by https://github.com/Templarian/MaterialDesign

office
Version 1.0.0
Delivered by https://github.com/Roemer/plantuml-office

osa
Version 0.0.1
Delivered by https://github.com/Crashedmind/PlantUML-opensecurityarchitecture-icons

tupadr3
Version 2.4.0
Delivered by https://github.com/tupadr3/plantuml-icon-font-sprites

It is also possible to use the command line `java -jar plantuml.jar -stdlib` to display the same list.

Finally, you can extract the full standard library sources using `java -jar plantuml.jar -extractstdlib`. All files will be extracted in the folder `stdlib`.

Sources used to build official PlantUML releases are hosted here https://github.com/plantuml/plantuml-

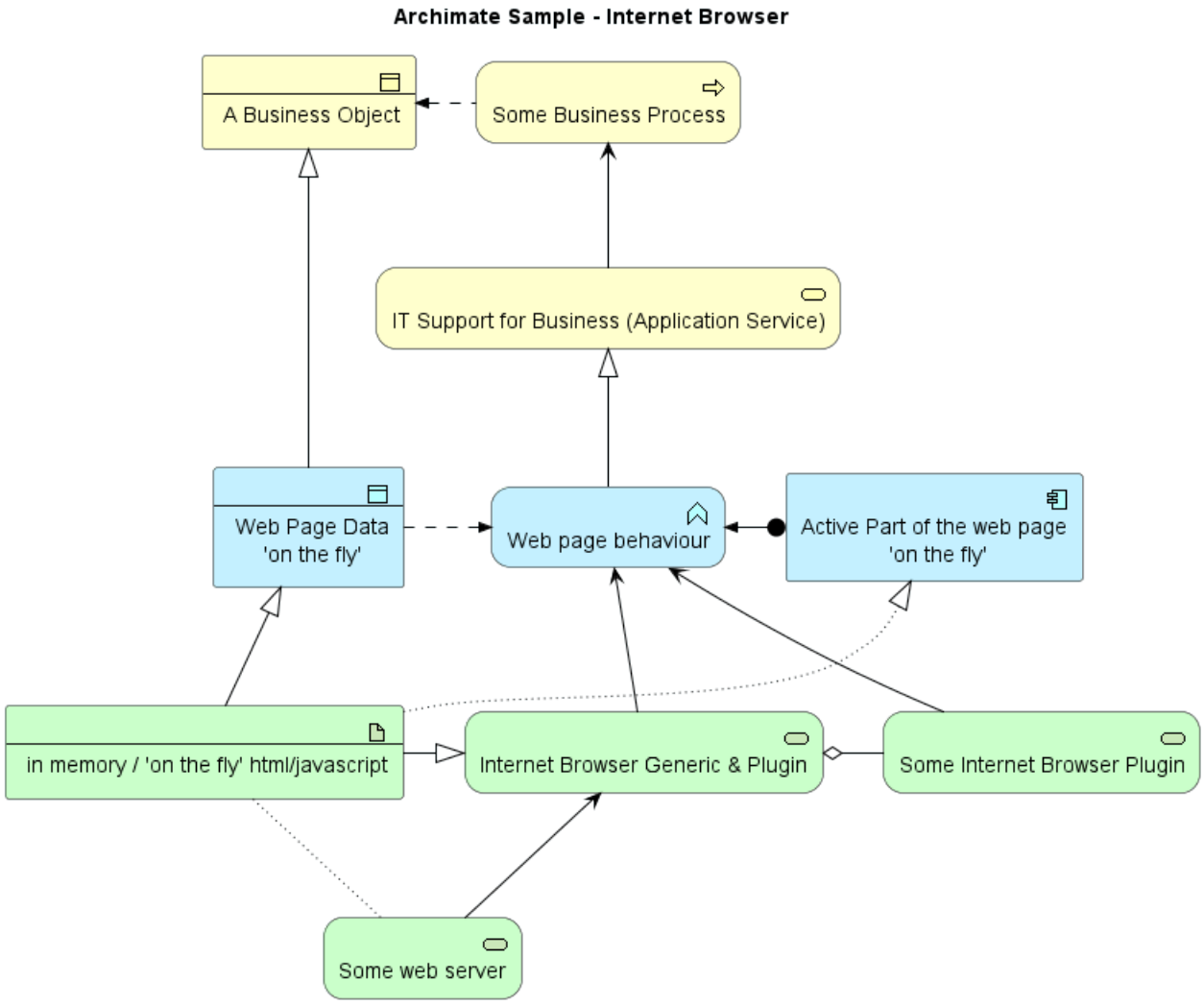
stdlib. You can create Pull Request to update or add some library if you find it relevant.

27.2 ArchiMate [archimate]

Type	Link
stdlib	https://github.com/plantuml/plantuml-stdlib/tree/master/archimate
src	https://github.com/ebbypeter/Archimate-PlantUML
orig	https://en.wikipedia.org/wiki/ArchiMate

This repository contains ArchiMate PlantUML macros and other includes for creating Archimate Diagrams easily and consistantly.

```
@startuml
!include <archimate/Archimate>

title Archimate Sample - Internet Browser

' Elements
Business_Object(businessObject, "A Business Object")
Business_Process(someBusinessProcess,"Some Business Process")
Business_Service(itSupportService, "IT Support for Business (Application Service)")

Application_DataObject(dataObject, "Web Page Data \n 'on the fly'")
Application_Function(webpageBehaviour, "Web page behaviour")
Application_Component(ActivePartWebPage, "Active Part of the web page \n 'on the fly'")

Technology_Artifact(inMemoryItem,"in memory / 'on the fly' html/javascript")
Technology_Service(internetBrowser, "Internet Browser Generic & Plugin")
Technology_Service(internetBrowserPlugin, "Some Internet Browser Plugin")
Technology_Service(webServer, "Some web server")

'Relationships
Rel_Flow_Left(someBusinessProcess, businessObject, "")
Rel_Serving_Up(itSupportService, someBusinessProcess, "")
Rel_Specialization_Up(webpageBehaviour, itSupportService, "")
Rel_Flow_Right(dataObject, webpageBehaviour, "")
Rel_Specialization_Up(dataObject, businessObject, "")
Rel_Assignment_Left(ActivePartWebPage, webpageBehaviour, "")
Rel_Specialization_Up(inMemoryItem, dataObject, "")
Rel_Realization_Up(inMemoryItem, ActivePartWebPage, "")
Rel_Specialization_Right(inMemoryItem,internetBrowser, "")
Rel_Serving_Up(internetBrowser, webpageBehaviour, "")
Rel_Serving_Up(internetBrowserPlugin, webpageBehaviour, "")
Rel_Aggregation_Right(internetBrowser, internetBrowserPlugin, "")
Rel_Access_Up(webServer, inMemoryItem, "")
Rel_Serving_Up(webServer, internetBrowser, "")
@enduml
```



27.2.1 List possible sprites

You can list all possible sprites for Archimate using the following diagram:

```
@startuml
listsprite
@enduml
```

27.3 Amazon Labs AWS Library [awslib]

Type	Link
stdlib	https://github.com/plantuml/plantuml-stdlib/tree/master/awslib
src	https://github.com/awslabs/aws-icons-for-plantuml
orig	https://aws.amazon.com/en/architecture/icons/

The Amazon Labs AWS library provides PlantUML sprites, macros, and other includes for Amazon Web Services (AWS) services and resources.

Used to create PlantUML diagrams with AWS components. All elements are generated from the official AWS Architecture Icons and when combined with PlantUML and the C4 model, are a great way to communicate your design, deployment, and topology as code.

```
@startuml
!include <awslib/AWSCommon>
!include <awslib/InternetOfThings/IoTRule>
!include <awslib/Analytics/KinesisDataStreams>
!include <awslib/ApplicationIntegration/SimpleQueueService>

left to right direction

agent "Published Event" as event #fff

IoTRule(iotRule, "Action Error Rule", "error if Kinesis fails")
KinesisDataStreams(eventStream, "IoT Events", "2 shards")
SimpleQueueService(errorQueue, "Rule Error Queue", "failed Rule actions")

event --> iotRule : JSON message
iotRule --> eventStream : messages
iotRule --> errorQueue : Failed action message
@enduml
```

27.4 Azure library [azure]

Type	Link
stdlib	https://github.com/plantuml/plantuml-stdlib/tree/master/azure
src	https://github.com/RicardoNiepel/Azure-PlantUML/
orig	Microsoft Azure

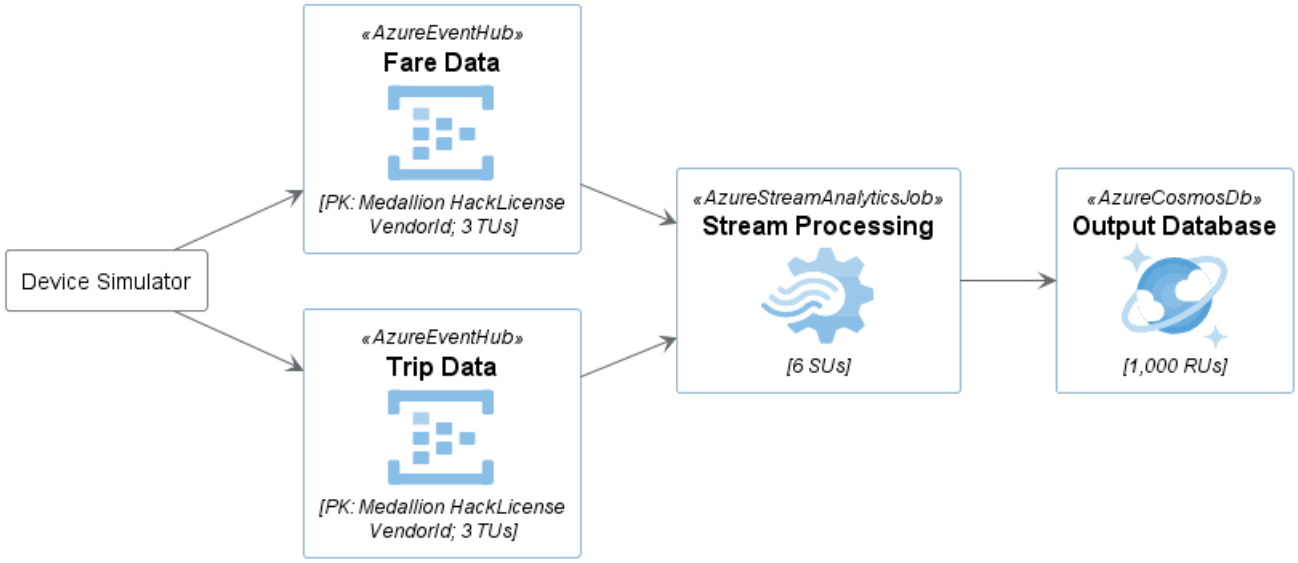
The Azure library consists of Microsoft Azure icons.

Use it by including the file that contains the sprite, eg: `!include <azure/Analytics/AzureEventHub>`. When imported, you can use the sprite as normally you would, using `<$sprite_name>`.

You may also include the `AzureCommon.puml` file, eg: `!include <azure/AzureCommon>`, which contains helper macros defined. With the `AzureCommon.puml` imported, you can use the `NAME_OF_SPRITE(parameters...)` macro.

Example of usage:

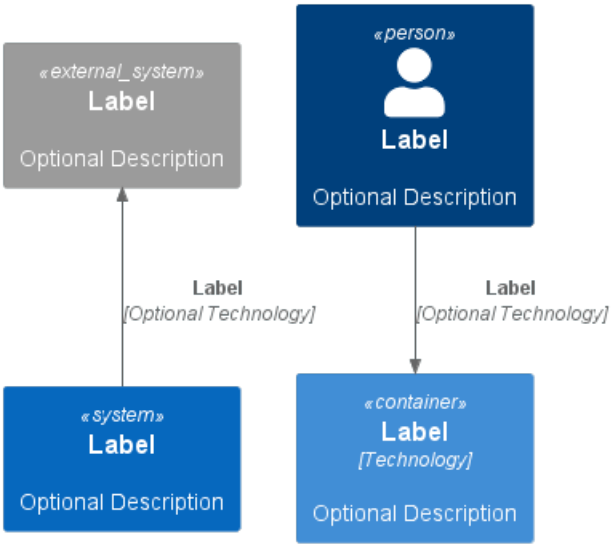
```
@startuml
!include <azure/AzureCommon>
!include <azure/Analytics/AzureEventHub>
!include <azure/Analytics/AzureStreamAnalyticsJob>
!include <azure/Databases/AzureCosmosDb>

left to right direction

agent "Device Simulator" as devices #fff

AzureEventHub(fareDataEventHub, "Fare Data", "PK: Medallion HackLicense VendorId; 3 TUs")
AzureEventHub(tripDataEventHub, "Trip Data", "PK: Medallion HackLicense VendorId; 3 TUs")
AzureStreamAnalyticsJob(streamAnalytics, "Stream Processing", "6 SUs")
AzureCosmosDb(outputCosmosDb, "Output Database", "1,000 RUs")

devices --> fareDataEventHub
devices --> tripDataEventHub
fareDataEventHub --> streamAnalytics
tripDataEventHub --> streamAnalytics
streamAnalytics --> outputCosmosDb
@enduml
```



27.5 C4 Library [C4]

Type	Link
stdlib	https://github.com/plantuml/plantuml-stdlib/tree/master/C4
src	https://github.com/plantuml-stdlib/C4-PlantUML
orig	https://en.wikipedia.org/wiki/C4_modelhttps://c4model.com

```
@startuml
!include <C4/C4_Container>

Person(personAlias, "Label", "Optional Description")
Container(containerAlias, "Label", "Technology", "Optional Description")
System(systemAlias, "Label", "Optional Description")

System_Ext(extSystemAlias, "Label", "Optional Description")

Rel(personAlias, containerAlias, "Label", "Optional Technology")

Rel_U(systemAlias, extSystemAlias, "Label", "Optional Technology")
@enduml
```



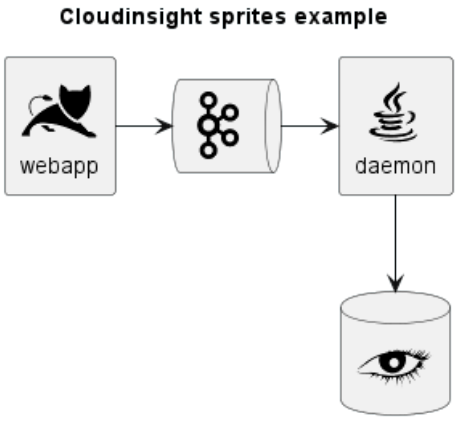
27.6 Cloud Insight [cloudinsight]

Type	Link
stdlib	https://github.com/plantuml/plantuml-stdlib/tree/master/cloudinsight
src	https://github.com/rabelenda/cicon-plantuml-sprites
orig	Cloudinsight icons

This repository contains PlantUML sprites generated from Cloudinsight icons, which can easily be used in PlantUML diagrams for nice visual representation of popular technologies.

```
@startuml
!include <cloudinsight/tomcat>
!include <cloudinsight/kafka>
!include <cloudinsight/java>
!include <cloudinsight/cassandra>

title Cloudinsight sprites example

skinparam monochrome true

rectangle "<$tomcat>\nwebapp" as webapp
```

```
queue "<$kafka>" as kafka
rectangle "<$java>\ndaemon" as daemon
database "<$cassandra>" as cassandra

webapp -> kafka
kafka -> daemon
daemon --> cassandra
@enduml
```



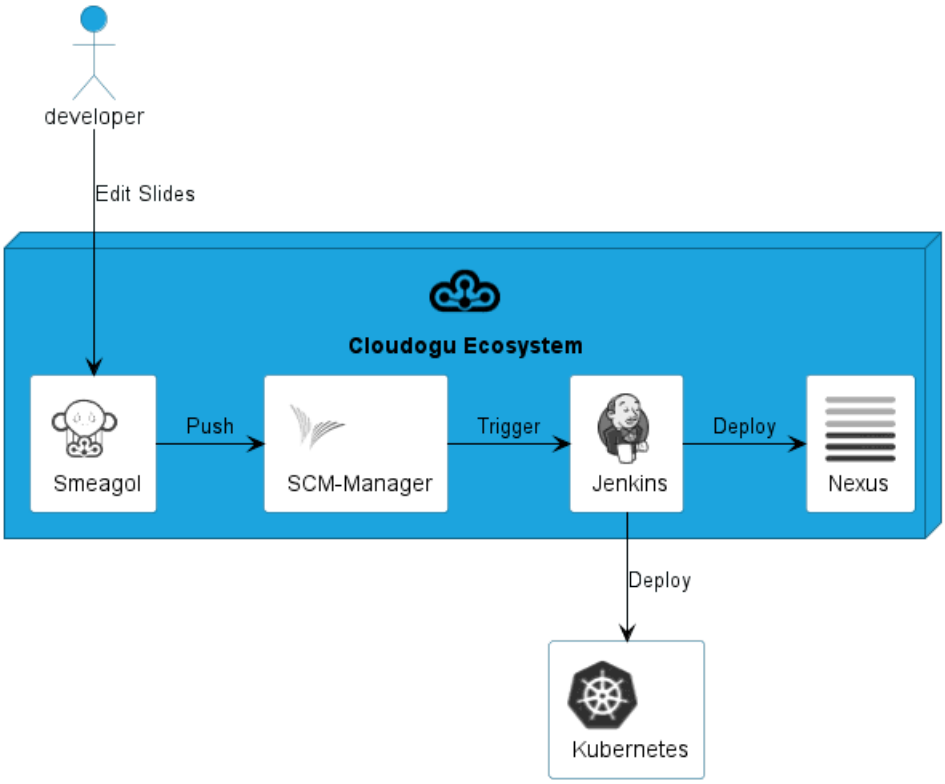
27.7 Cloudogu [cloudogu]

Type	Link
stdlib	https://github.com/plantuml/plantuml-stdlib/tree/master/cloudogu
src	https://github.com/cloudogu/plantuml-cloudogu-sprites
orig	https://cloudogu.com

The Cloudogu library provides PlantUML sprites, macros, and other includes for Cloudogu services and resources.

```
@startuml
!include <cloudogu/common>
!include <cloudogu/dogus/jenkins>
!include <cloudogu/dogus/cloudogu>
!include <cloudogu/dogus/scm>
!include <cloudogu/dogus/smeagol>
!include <cloudogu/dogus/nexus>
!include <cloudogu/tools/k8s>

node "Cloudogu Ecosystem" <<$cloudogu>> {
DOGU_JENKINS(jenkins, Jenkins) #ffffff
DOGU_SCM(scm, SCM-Manager) #ffffff
DOGU_SMEAGOL(smeagol, Smeagol) #ffffff
DOGU_NEXUS(nexus,Nexus) #ffffff
}

TOOL_K8S(k8s, Kubernetes) #ffffff

actor developer

developer --> smeagol : "Edit Slides"
smeagol -> scm : Push
scm -> jenkins : Trigger
jenkins -> nexus : Deploy
jenkins --> k8s : Deploy
```

```
@enduml
```



All cloudogu sprites

See all possible cloudogu sprites on plantuml-cloudogu-sprites.

27.8 Elastic library [elastic]

Type	Link
`stdlib`	https://github.com/plantuml/plantuml-stdlib/tree/master/elastic
`src`	https://github.com/Crashedmind/PlantUML-Elastic-icons
`orig`	Elastic

The Elastic library consists of Elastic icons. It is similar in use to the AWS and Azure libraries (it used the same tool to create them).

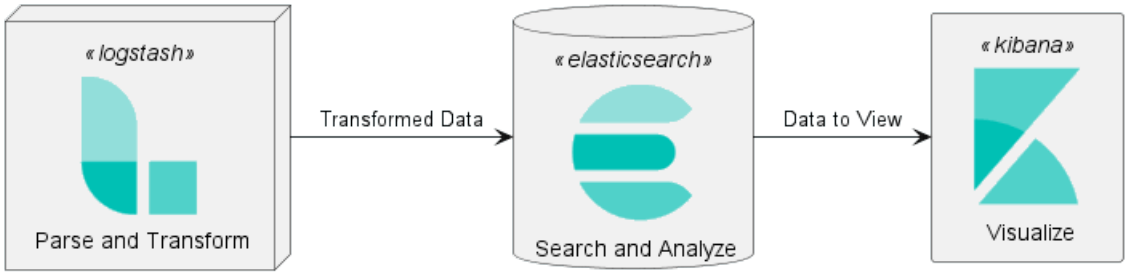
Use it by including the file that contains the sprite, eg: `!include elastic/elastic_search/elastic_search>`. When imported, you can use the sprite as normally you would, using `<$sprite_name>`.

You may also include the `common.puml` file, eg: `!include <elastic/common>`, which contains helper macros defined. With the `common.puml` imported, you can use the `NAME//OF//SPRITE(parameters...)` macro.

Example of usage:

```
@startuml
!include <elastic/common>
!include <elastic/elasticsearch/elasticsearch>
!include <elastic/logstash/logstash>
!include <elastic/kibana/kibana>

ELASTICSEARCH(ElasticSearch, "Search and Analyze",database)
LOGSTASH(Logstash, "Parse and Transform",node)
KIBANA(Kibana, "Visualize",agent)

Logstash -right-> ElasticSearch: Transformed Data
```

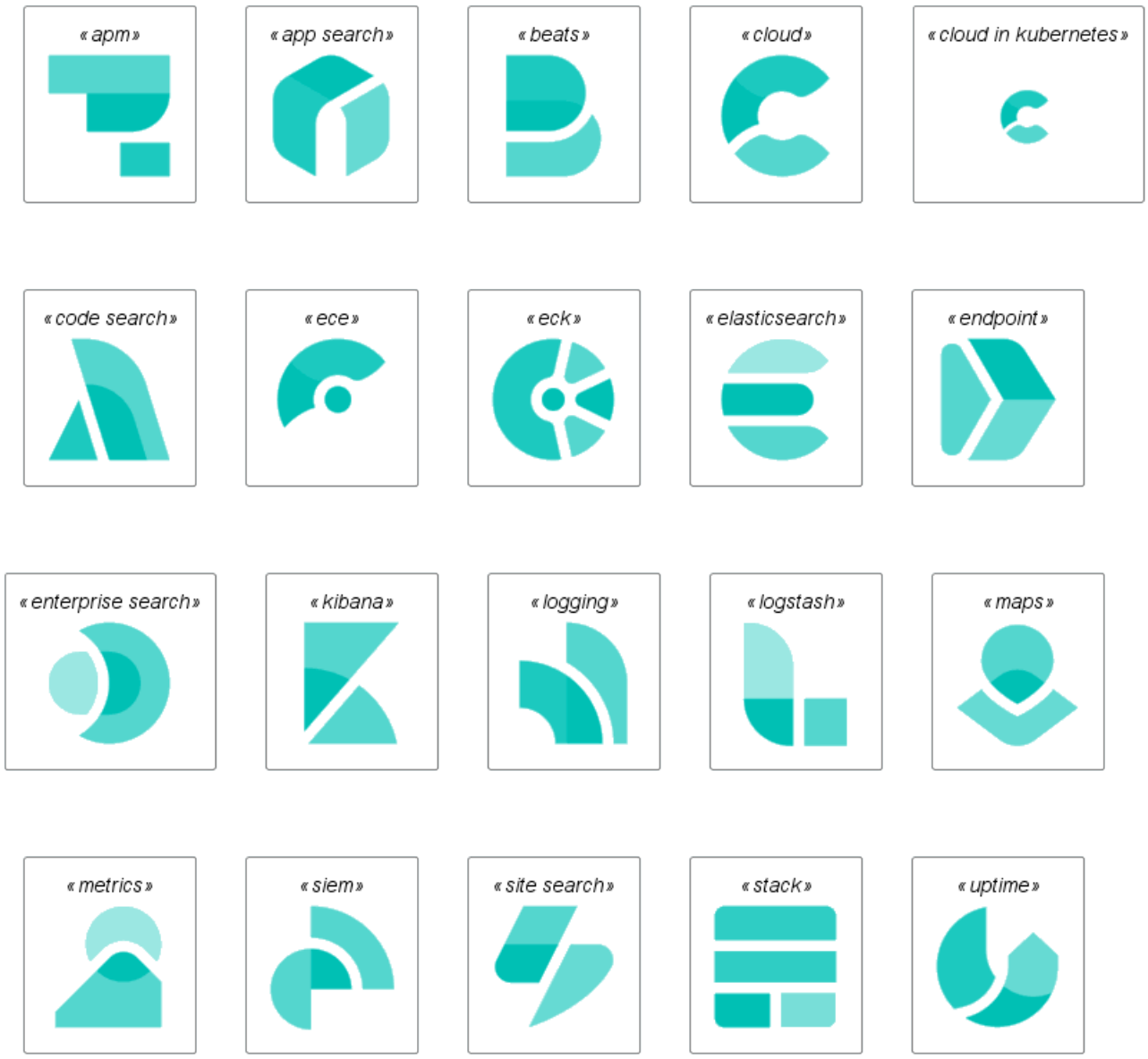
```
ElasticSearch -right-> Kibana: Data to View
@enduml
```



All Elastic Sprite Set

```
@startuml
'Adapted from https://github.com/Crashedmind/PlantUML-Elastic-icons/blob/master/All.puml

'Elastic stuff here
'================================

!include <elastic/common>
!include <elastic/apm/apm>
!include <elastic/app_search/app_search>
!include <elastic/beats/beats>
!include <elastic/cloud/cloud>
!include <elastic/cloud_in_kubernetes/cloud_in_kubernetes>
!include <elastic/code_search/code_search>
!include <elastic/ece/ece>
!include <elastic/eck/eck>
' Beware of the difference between Crashedmind and plantuml-stdlib version: with '_' usage!
!include <elastic/elasticsearch/elasticsearch>
!include <elastic/endpoint/endpoint>
!include <elastic/enterprise_search/enterprise_search>
!include <elastic/kibana/kibana>
!include <elastic/logging/logging>
!include <elastic/logstash/logstash>
!include <elastic/maps/maps>
!include <elastic/metrics/metrics>
!include <elastic/siem/siem>
!include <elastic/site_search/site_search>
!include <elastic/stack/stack>
!include <elastic/uptime/uptime>

skinparam agentBackgroundColor White

APM(apm)
APP_SEARCH(app_search)
BEATS(beats)
CLOUD(cloud)
CLOUD_IN_KUBERNETES(cloud_in_kubernetes)
CODE_SEARCH(code_search)
ECE(ece)
ECK(eck)
ELASTICSEARCH(elastic_search)
ENDPOINT(endpoint)
ENTERPRISE_SEARCH(enterprise_search)
KIBANA(kibana)
LOGGING(logging)
```

```
LOGSTASH(logstash)
MAPS(maps)
METRICS(metrics)
SIEM(siem)
SITE_SEARCH(site_search)
STACK(stack)
UPTIME(uptime)
@enduml
```



27.9 Google Material Icons [material]

Type	Link
stdlib	https://github.com/plantuml/plantuml-stdlib/tree/master/material
src	https://github.com/Templarian/MaterialDesign
orig	Material Design Icons

This library consists of a free Material style icons from Google and other artists.

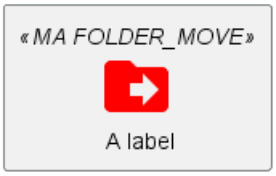
Use it by including the file that contains the sprite, eg: `!include <material/ma_folder_move>`. When imported, you can use the sprite as normally you would, using `<$ma_sprite_name>`. Notice that this

library requires an `ma_` prefix on sprites names, this is to avoid clash of names if multiple sprites have the same name on different libraries.

You may also include the `common.puml` file, eg: `!include <material/common>`, which contains helper macros defined. With the `common.puml` imported, you can use the `MA_NAME_OF_SPRITE(parameters...)` macro, note again the use of the prefix `MA_`.

Example of usage:

```
@startuml
!include <material/common>
' To import the sprite file you DON'T need to place a prefix!
!include <material/folder_move>

MA_FOLDER_MOVE(Red, 1, dir, rectangle, "A label")
@enduml
```



Notes:

When mixing sprites macros with other elements you may get a syntax error if, for example, trying to add a rectangle along with classes. In those cases, add `{` and `}` after the macro to create the empty rectangle.

Example of usage:

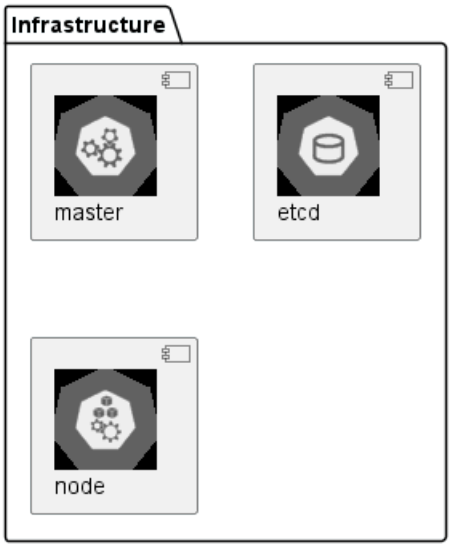
```
@startuml
!include <material/common>
' To import the sprite file you DON'T need to place a prefix!
!include <material/folder_move>

MA_FOLDER_MOVE(Red, 1, dir, rectangle, "A label") {
}

class foo {
    bar
}
@enduml
```

27.10 Kubernetes [kubernetes]

Type	Link
`stdlib`	https://github.com/plantuml/plantuml-stdlib/tree/master/kubernetes
`src`	https://github.com/michiel/plantuml-kubernetes-sprites
`orig`	Kubernetes

```
@startuml
!include <kubernetes/k8s-sprites-unlabeled-25pct>
package "Infrastructure" {
  component "<$master>\nmaster" as master
```

```
  component "<$etcd>\netcd" as etcd
  component "<$node>\nnode" as node
}
@enduml
```

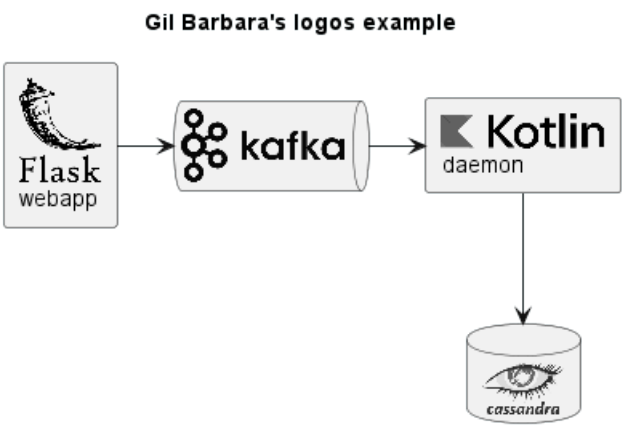


27.11 Logos [logos]

Type	Link
stdlib	https://github.com/plantuml/plantuml-stdlib/tree/master/logos
src	https://github.com/plantuml-stdlib/gilbarbara-plantuml-sprites
orig	Gil Barbara's logos

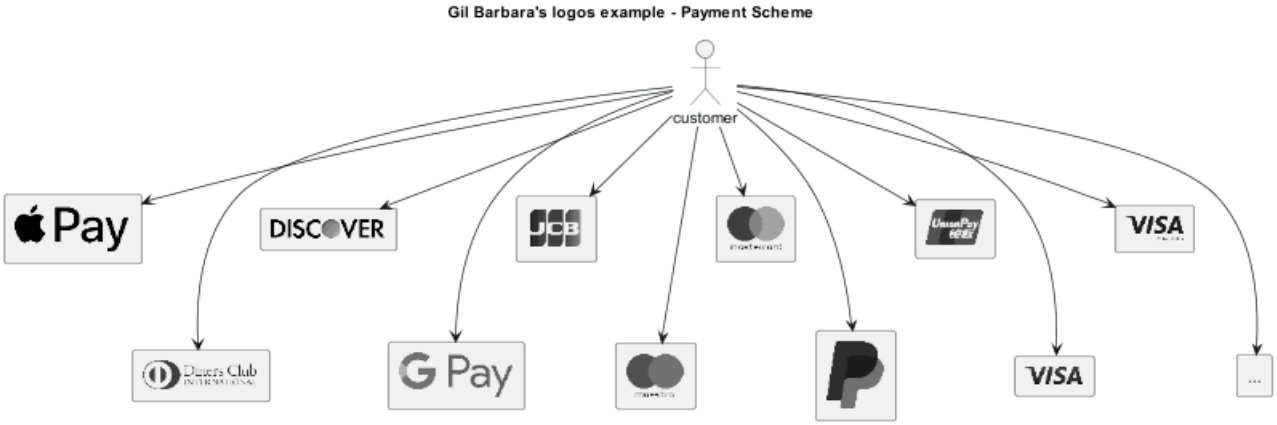
This repository contains PlantUML sprites generated from Gil Barbara's logos, which can easily be used in PlantUML diagrams for nice visual aid.

```
@startuml
!include <logos/flask>
!include <logos/kafka>
!include <logos/kotlin>
!include <logos/cassandra>

title Gil Barbara's logos example

skinparam monochrome true

rectangle "<$flask>\nwebapp" as webapp
queue "<$kafka>" as kafka
rectangle "<$kotlin>\ndaemon" as daemon
database "<$cassandra>" as cassandra

webapp -> kafka
kafka -> daemon
daemon --> cassandra
@enduml
```




```
@startuml
scale 0.7
!include <logos/apple-pay>
!include <logos/dinersclub>
!include <logos/discover>
!include <logos/google-pay>
!include <logos/jcb>
!include <logos/maestro>
!include <logos/mastercard>
!include <logos/paypal>
!include <logos/unionpay>
!include <logos/visaelectron>
!include <logos/visa>
' ...

title Gil Barbara's logos example - **Payment Scheme**

actor customer
rectangle "<$apple-pay>"    as ap
rectangle "<$dinersclub>"   as dc
rectangle "<$discover>"     as d
rectangle "<$google-pay>"   as gp
rectangle "<$jcb>"          as j
rectangle "<$maestro>"      as ma
rectangle "<$mastercard>"   as m
rectangle "<$paypal>"       as p
rectangle "<$unionpay>"     as up
rectangle "<$visa>"         as v
rectangle "<$visaelectron>" as ve
rectangle "..." as etc

customer --> ap
customer ---> dc
customer --> d
customer ---> gp
customer --> j
customer ---> ma
customer --> m
customer ---> p
customer --> up
customer ---> v
customer --> ve
customer ---> etc
```

```
@enduml
```



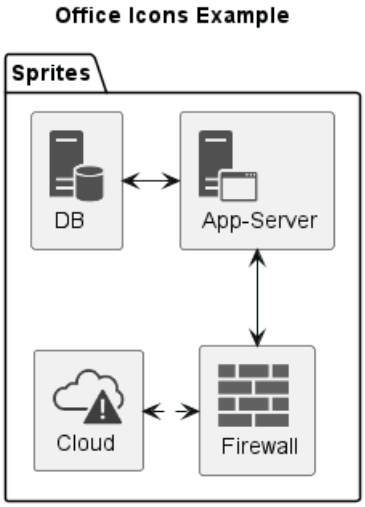
27.12 Office [office]

Type	Link
stdlib	https://github.com/plantuml/plantuml-stdlib/tree/master/office
src	https://github.com/Roemer/plantuml-office
orig	

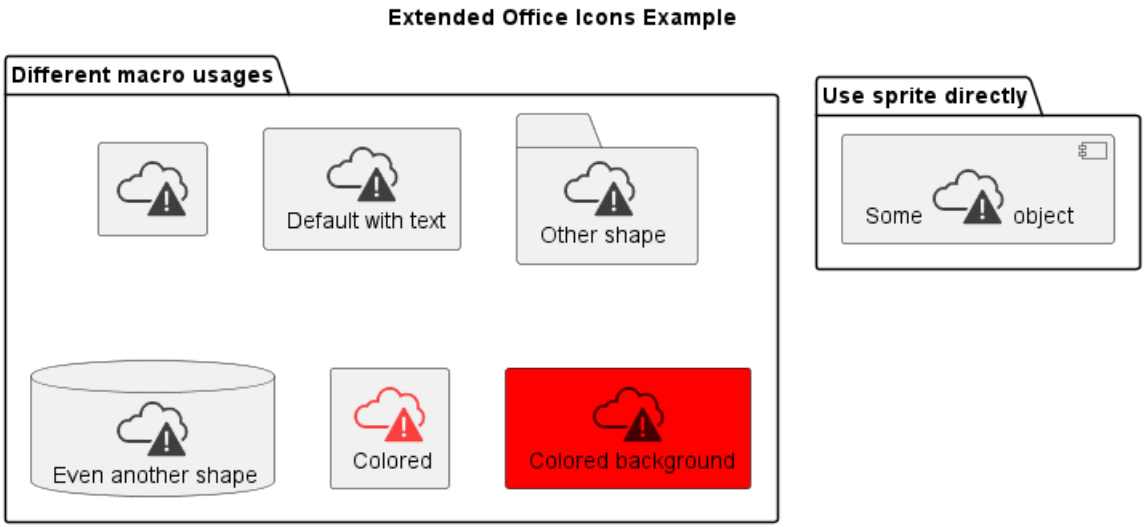
There are sprites (*.puml) and colored png icons available. Be aware that the sprites are all only monochrome even if they have a color in their name (due to automatically generating the files). You can either color the sprites with the macro (see examples below) or directly use the fully colored pngs. See the following examples on how to use the sprites, the pngs and the macros.

Example of usage:

```
@startuml
!include <tupadr3/common>

!include <office/Servers/database_server>
!include <office/Servers/application_server>
!include <office/Concepts/firewall_orange>
!include <office/Clouds/cloud_disaster_red>

title Office Icons Example

package "Sprites" {
    OFF_DATABASE_SERVER(db,DB)
    OFF_APPLICATION_SERVER(app,App-Server)
    OFF_FIREWALL_ORANGE(fw,Firewall)
    OFF_CLOUD_DISASTER_RED(cloud,Cloud)
    db <-> app
    app <--> fw
    fw <.left.> cloud
}
@enduml
```




```
@startuml
!include <tupadr3/common>

!include <office/servers/database_server>
!include <office/servers/application_server>
!include <office/Concepts/firewall_orange>
!include <office/Clouds/cloud_disaster_red>

' Used to center the label under the images
skinparam defaultTextAlignment center

title Extended Office Icons Example

package "Use sprite directly" {
    [Some <$cloud_disaster_red> object]
}

package "Different macro usages" {
    OFF_CLOUD_DISASTER_RED(cloud1)
    OFF_CLOUD_DISASTER_RED(cloud2,Default with text)
    OFF_CLOUD_DISASTER_RED(cloud3,Other shape,Folder)
    OFF_CLOUD_DISASTER_RED(cloud4,Even another shape,Database)
    OFF_CLOUD_DISASTER_RED(cloud5,Colored,Rectangle, red)
    OFF_CLOUD_DISASTER_RED(cloud6,Colored background) #red
}
@enduml
```



27.13 Open Security Architecture (OSA) [osa]

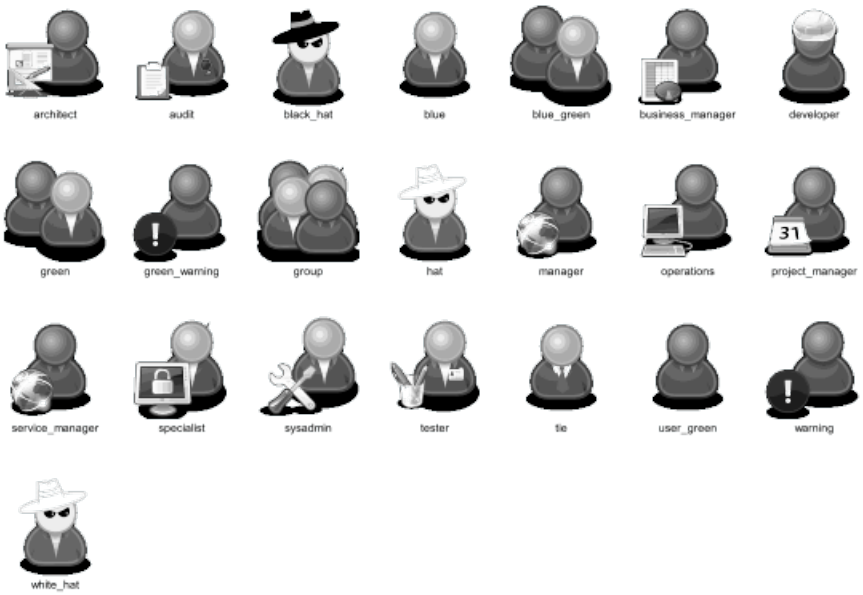
Type	Link
stdlib	https://github.com/plantuml/plantuml-stdlib/tree/master/osa
src	https://github.com/Crashedmind/PlantUML-opensecurityarchitecture-iconshttps://github.com/Crashedmind
orig	https://www.opensecurityarchitecture.org

```
@startuml
'Adapted from https://github.com/Crashedmind/PlantUML-opensecurityarchitecture-icons/blob/master/all
scale .5
!include <osa/arrow/green/left/left>
!include <osa/arrow/yellow/right/right>
!include <osa/awareness/awareness>
!include <osa/contract/contract>
!include <osa/database/database>
!include <osa/desktop/desktop>
!include <osa/desktop/imac/imac>
!include <osa/device_music/device_music>
!include <osa/device_scanner/device_scanner>
!include <osa/device_usb/device_usb>
!include <osa/device_wireless_router/device_wireless_router>
!include <osa/disposal/disposal>
!include <osa/drive_optical/drive_optical>
!include <osa/firewall/firewall>
!include <osa/hub/hub>
!include <osa/ics/drive/drive>
!include <osa/ics/plc/plc>
!include <osa/ics/thermometer/thermometer>
!include <osa/id/card/card>
!include <osa/laptop/laptop>
!include <osa/lifecycle/lifecycle>
!include <osa/lightning/lightning>
!include <osa/media_flash/media_flash>
!include <osa/media_optical/media_optical>
!include <osa/media_tape/media_tape>
!include <osa/mobile/pda/pda>
!include <osa/padlock/padlock>
!include <osa/printer/printer>
!include <osa/site_branch/site_branch>
!include <osa/site_factory/site_factory>
!include <osa/vpn/vpn>
```

```
!include <osa/wireless/network/network>

rectangle "OSA" {
rectangle "Left:\n <$left>"
rectangle "Right:\n <$right>"
rectangle "Awareness:\n <$awareness>"
rectangle "Contract:\n <$contract>"
rectangle "Database:\n <$database>"
rectangle "Desktop:\n <$desktop>"
rectangle "Imac:\n <$imac>"
rectangle "Device_music:\n <$device_music>"
rectangle "Device_scanner:\n <$device_scanner>"
rectangle "Device_usb:\n <$device_usb>"
rectangle "Device_wireless_router:\n <$device_wireless_router>"
rectangle "Disposal:\n <$disposal>"
rectangle "Drive_optical:\n <$drive_optical>"
rectangle "Firewall:\n <$firewall>"
rectangle "Hub:\n <$hub>"
rectangle "Drive:\n <$drive>"
rectangle "Plc:\n <$plc>"
rectangle "Thermometer:\n <$thermometer>"
rectangle "Card:\n <$card>"
rectangle "Laptop:\n <$laptop>"
rectangle "Lifecycle:\n <$lifecycle>"
rectangle "Lightning:\n <$lightning>"
rectangle "Media_flash:\n <$media_flash>"
rectangle "Media_optical:\n <$media_optical>"
rectangle "Media_tape:\n <$media_tape>"
rectangle "Pda:\n <$pda>"
rectangle "Padlock:\n <$padlock>"
rectangle "Printer:\n <$printer>"
rectangle "Site_branch:\n <$site_branch>"
rectangle "Site_factory:\n <$site_factory>"
rectangle "Vpn:\n <$vpn>"
rectangle "Network:\n <$network>"
}
@enduml
```

```
@startuml
scale .5
!include <osa/user/audit/audit>
'beware of 'hat-sprite'
!include <osa/user/black/hat/hat-sprite>
!include <osa/user/blue/blue>
!include <osa/user/blue/security/specialist/specialist>
!include <osa/user/blue/sysadmin/sysadmin>
!include <osa/user/blue/tester/tester>
!include <osa/user/blue/tie/tie>
!include <osa/user/green/architect/architect>
!include <osa/user/green/business/manager/manager>
!include <osa/user/green/developer/developer>
!include <osa/user/green/green>
!include <osa/user/green/operations/operations>
!include <osa/user/green/project/manager/manager>
!include <osa/user/green/service/manager/manager>
!include <osa/user/green/warning/warning>
!include <osa/user/large/group/group>
!include <osa/users/blue/green/green>
!include <osa/user/white/hat/hat>

listsprites
```

```
@enduml
```



27.14 Tupadr3 library [tupadr3]

Type	Link
stdlib	https://github.com/plantuml/plantuml-stdlib/tree/master/tupadr3
src	https://github.com/tupadr3/plantuml-icon-font-sprites
orig	https://github.com/tupadr3/plantuml-icon-font-sprites#icon-sets

This library contains several libraries of icons (including Devicons and Font Awesome).

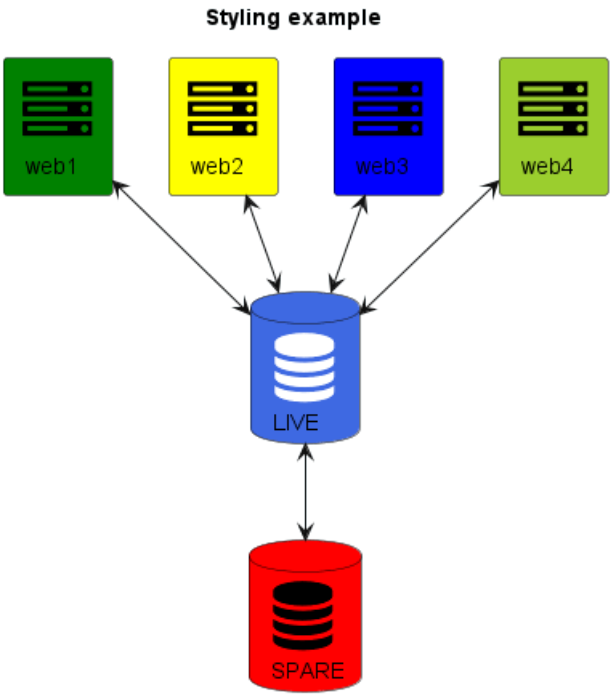
Use it by including the file that contains the sprite, eg: `!include <font-awesome/align_center>`. When imported, you can use the sprite as normally you would, using `<$sprite_name>`.

You may also include the `common.puml` file, eg: `!include <font-awesome/common>`, which contains helper macros defined. With the `common.puml` imported, you can use the `NAME_OF_SPRITE(parameters...)` macro.

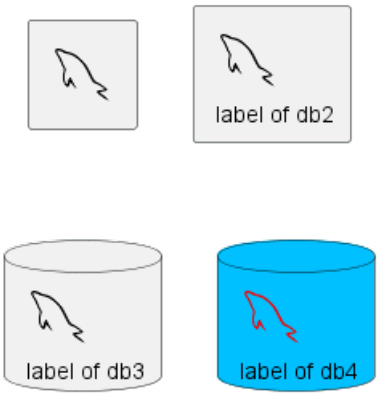
Example of usage:

```
@startuml
!include <tupadr3/common>
!include <tupadr3/font-awesome/server>
!include <tupadr3/font-awesome/database>

title Styling example

FA_SERVER(web1,web1) #Green
FA_SERVER(web2,web2) #Yellow
FA_SERVER(web3,web3) #Blue
FA_SERVER(web4,web4) #YellowGreen

FA_DATABASE(db1,LIVE,database,white) #RoyalBlue
FA_DATABASE(db2,SPARE,database) #Red

db1 <--> db2

web1 <--> db1
web2 <--> db1
web3 <--> db1
web4 <--> db1
```

```
@enduml
```




```
@startuml
!include <tupadr3/common>
!include <tupadr3/devicons/mysql>

DEV_MYSQL(db1)
DEV_MYSQL(db2,label of db2)
DEV_MYSQL(db3,label of db3,database)
DEV_MYSQL(db4,label of db4,database,red) #DeepSkyBlue
@enduml
```



27.15 AWS library [aws]

Type	Link
stdlib	https://github.com/plantuml/plantuml-stdlib/tree/master/aws
src	https://github.com/milo-minderbinder/AWS-PlantUML
orig	https://aws.amazon.com/en/architecture/icons/

Warning: We are thinking about deprecating this library.

So you should probably use `<awslib>` instead (see above).

hr

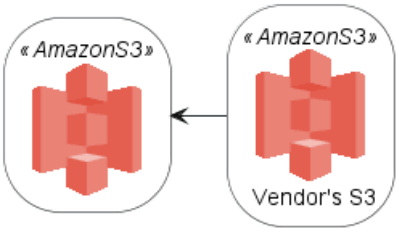
The AWS library consists of Amazon AWS icons, it provides icons of two different sizes (normal and large).

Use it by including the file that contains the sprite, eg: `!include <aws/Storage/AmazonS3/AmazonS3>`. When imported, you can use the sprite as normally you would, using `<$sprite_name>`.

You may also include the `common.puml` file, eg: `!include <aws/common>`, which contains helper macros defined. With the `common.puml` imported, you can use the `NAME_OF_SPRITE(parameters...)` macro.

Example of usage:

```
@startuml
!include <aws/common>
!include <aws/Storage/AmazonS3/AmazonS3>

AMAZONS3(s3_internal)
AMAZONS3(s3_partner,"Vendor's S3")
s3_internal <- s3_partner
@enduml
```



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