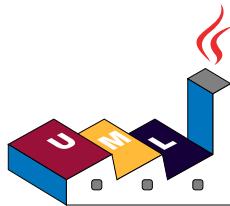


# Построение диаграмм UML с использованием PlantUML



Справочное руководство по языку PlantUML

(Version 1.2021.2)

**PlantUML** — проект с открытым кодом, позволяющий быстро создавать:

- Диаграммы последовательности
- Диаграммы прецедентов
- Диаграммы классов
- Диаграммы объектов
- Диаграммы активности
- Диаграммы компонентов
- Диаграмма развёртывания
- Диаграммы состояний
- Диаграмма синхронизации

Также поддерживаются следующие не-UML-диаграммы:

- JSON Data
- YAML Data
- Network diagram (nwdiag)
- Wireframe graphical interface
- Archimate diagram
- Specification and Description Language (SDL)
- Ditaa diagram
- Gantt diagram
- MindMap diagram
- Work Breakdown Structure diagram
- Mathematic with AsciiMath or JLaTeXMath notation
- Entity Relationship diagram

Для создания диаграмм применяется простой и интуитивно понятный язык.

# 1 Диаграмма последовательности

## 1.1 Основные примеры

Последовательность → используется для отображения сообщения между двумя участниками (participants). Предварительное объявление участников не требуется.

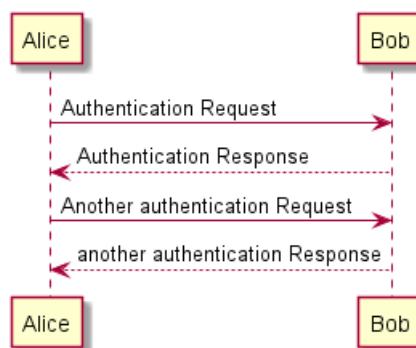
Чтобы получить пунктирную стрелку, используйте -->.

Также возможно использование обратных стрелок <- и <--. Это не изменит отображения, но может улучшить читаемость.

Это верно только для диаграмм последовательности, для других диаграмм правила отличаются.

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

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



## 1.2 Объявление участников

При использовании ключевого слова `participant` возможно получить больший контроль над отображением участников. Порядок перечисления участников задаёт также порядок отображения участников по умолчанию.

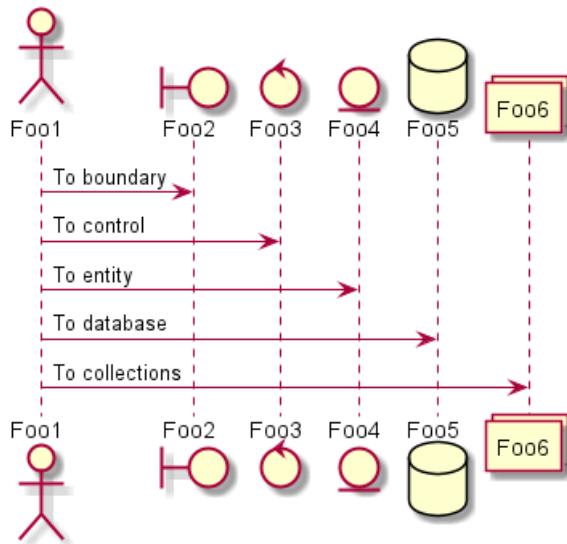
Использование других ключевых слов (отличных от `participant`) позволяет изменить представление участника:

- 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

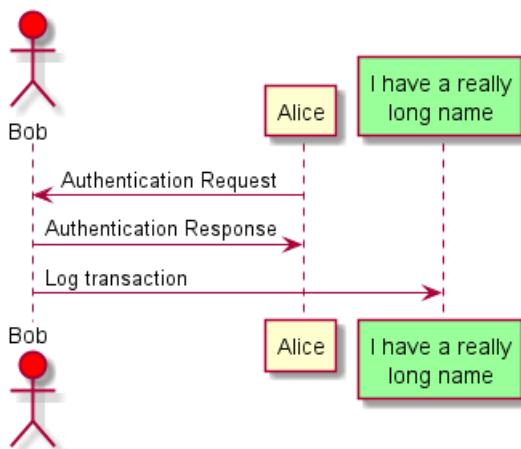


Возможно переименовать участника используя ключевое слово `as`.

Также возможно изменить цвет фона участника.

```
@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
```

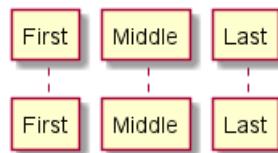


Возможно изменить порядок следования участников с помощью ключевого слова `order`.

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



@enduml

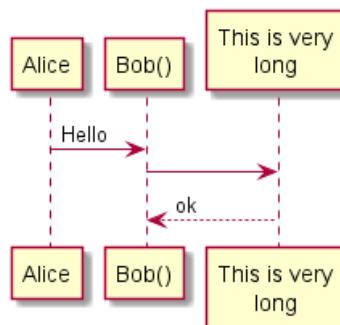


### 1.3 Использование небуквенных символов в названиях участников

Вы можете использовать кавычки для задания участников. Также Вы можете использовать ключевое слово as для присвоения псевдонимов к этим участникам.

```

@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
  
```



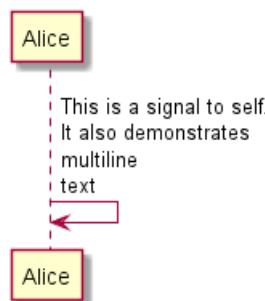
### 1.4 Сообщения к самому себе

Участник может посыпать сообщения сам себе.

Также возможно создание многострочных сообщений, используя .

```

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



### 1.5 Text alignment

#### 1.5.1 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.

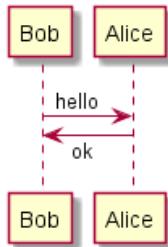
```
@startuml
```



```

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

```



**TODO:** TODO Link to Text Alignment on skinparam page.

## 1.6 Изменение стиля стрелок

Можно изменить стиль стрелок следующими способами:

- закончить стрелку с помощью x для обозначения потерянного сообщения
- использовать \ или / вместо < или > для создания только верхней или нижней части стрелки
- повторить окончание стрелки (например, >> or //) для тонкой отрисовки
- использовать -- вместо - для создания пунктирной стрелки
- заканчивать символом "o" во главе стрелки
- использовать двунаправленные стрелки <->

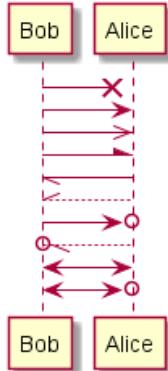
```

@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

```

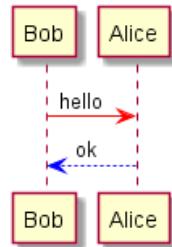


## 1.7 Изменить цвет стрелок

Вы можете изменить цвет отдельных стрелок, используя следующие правила:



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



## 1.8 Нумерация сообщений в последовательностях

Ключевое слово `autonumber` используется для автоматической нумерации сообщений.

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



Вы можете обозначить число с которого начнется отсчет `autonumber //start//`, и число которое будет использоваться в качестве инкремента `autonumber //start// //increment//`.

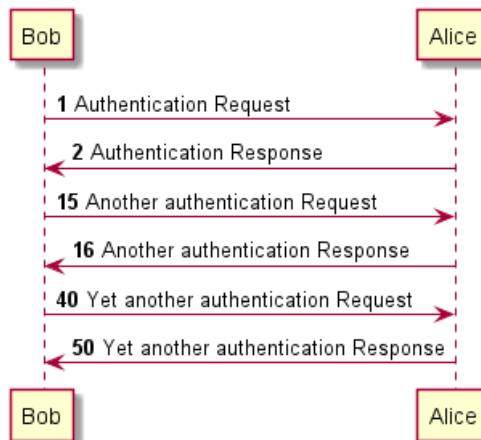
```
@startuml
autonumber
Bob -> Alice : Authentication Request
Bob <- Alice : Authentication Response

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
```





Можно задавать формат чисел, указав его в двойных кавычках.

Форматирование выполнено с использованием класса Java DecimalFormat (0 означает цифру, # означает цифру или ноль если отсутствует).

При форматировании также можно использовать теги html.

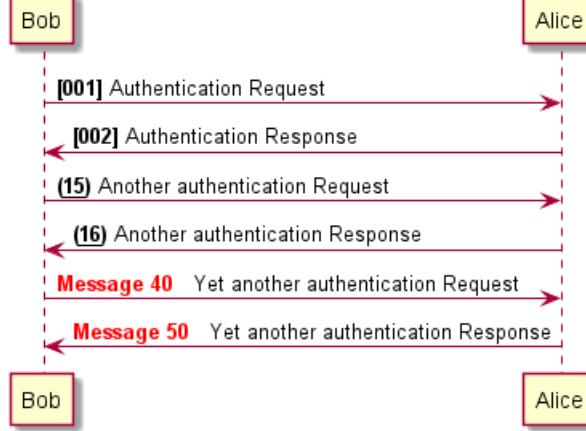
```

@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



Вы так же можете использовать autonumber stop и autonumber resume //increment// //format// чтобы соответственно остановить и продолжить автоматическое нумерование.

```

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

autonumber stop
  
```



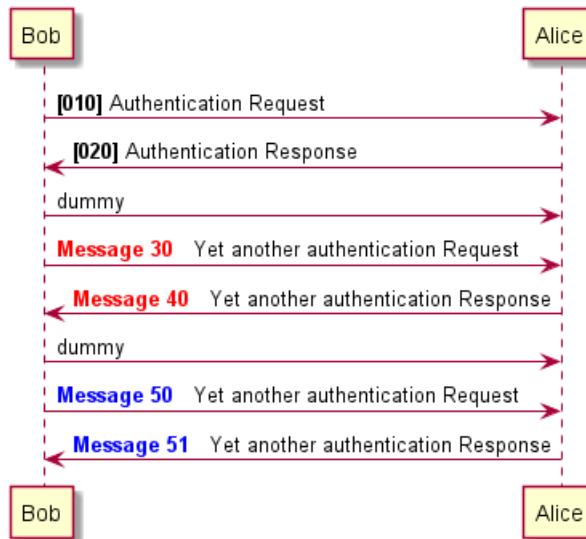
```
Bob -> Alice : dummy
```

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



## 1.9 Page Title, Header and Footer

The `title` keyword is used to add a title to the page.

Pages can display headers and footers using `header` and `footer`.

```
@startuml
```

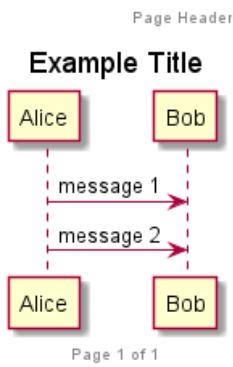
```
header Page Header
footer Page %page% of %lastpage%
```

```
title Example Title
```

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

```
@enduml
```





## 1.10 Разбиение диаграмм

Ключевое слово `newpage` используется для разбиения диаграмм на несколько изображений.

Вы можете указать название страницы сразу после ключевого слова `newpage`.

Это очень полезно для печати длинных диаграмм на нескольких страницах.

`@startuml`

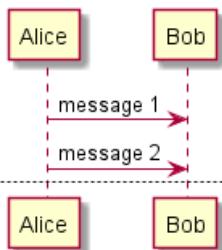
```
Alice -> Bob : message 1
Alice -> Bob : message 2
```

`newpage`

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

`newpage A title for the\last page`

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



## 1.11 Группировка сообщений

Группировать сообщения возможно используя следующие ключевые слова:

- `alt/else`
- `opt`
- `loop`
- `par`
- `break`
- `critical`
- `group`, соответствует тексту который должен быть отображен



Имеется возможность добавить текст который должен быть отображен в заголовке. Ключевое слово `end` используется для завершения группы. Имейте ввиду что допускаются вложенные группы.

Ключевое слово `end` закрывает группу.

Допустимо вложение группы в группу.

```
@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
```

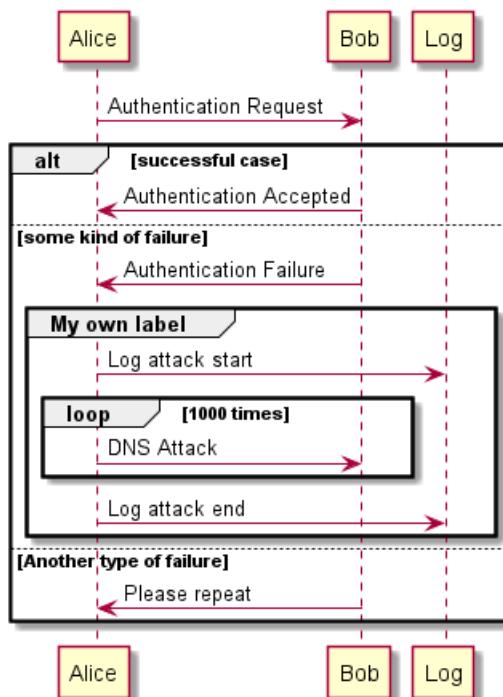
```
    end
```

```
else Another type of failure
```

```
    Bob -> Alice: Please repeat
```

```
end
```

```
@enduml
```



## 1.12 Secondary group label

For group, it is possible to add, between [ and ], a secondary text or label that will be displayed into the header.

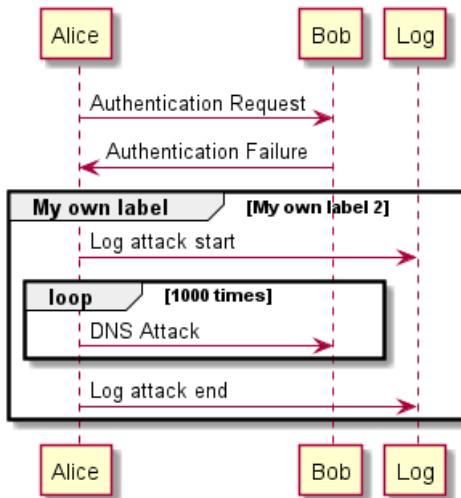
```
@startuml
```



```

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]

## 1.13 Примечания в сообщениях

Можно помещать заметки к сообщениям, используя ключевые слова `note left` или `note right` сразу после сообщения.

Можно делать многострочные заметки используя ключевое слово `end note` для завершения.

```

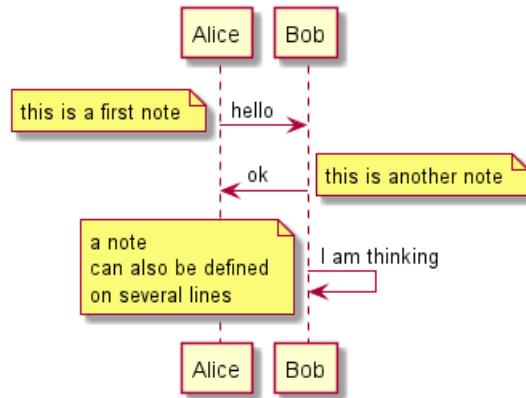
@startuml
Alice->Bob : hello
note left: this is a first note

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

```





## 1.14 Другие примечания

Возможно размещение примечаний относительно участников с использованием ключевых слов `note left of`, `note right of` или `note over`.

Возможно выделить примечание, изменив цвет фона.

Также возможно создать многострочное примечание, используя ключевое слово `end note`.

```

@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.

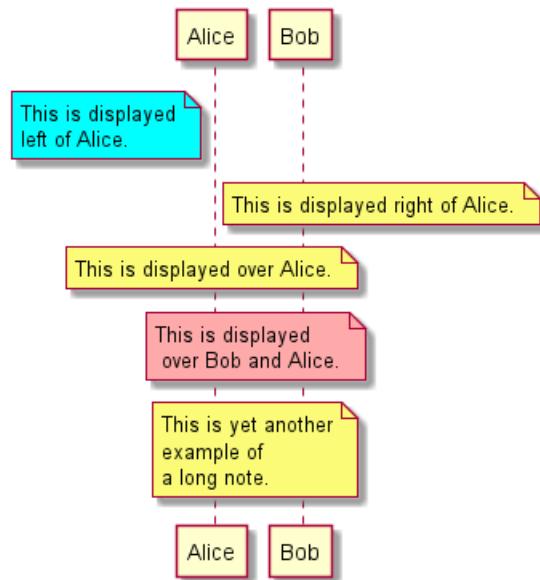
note over Alice: This is displayed over Alice.

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

```





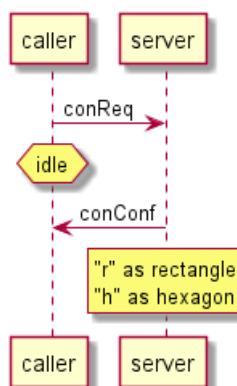
## 1.15 Изменение формы примечаний

Вы можете использовать hnote и rnote для изменения формы примечаний.

```

@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)]\*

## 1.16 Note over all participants [across]

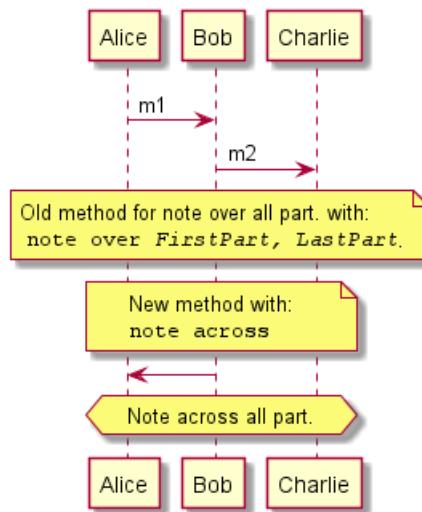
You can directly make a note over all participants, with the syntax:

- 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, LastPart"
note across: New method with:\n""note across""
```

```
Bob->Alice
```

```
hnote across:Note across all part.  
@enduml
```



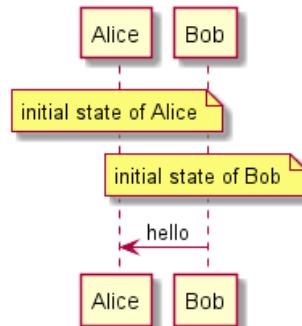
[Ref. QA-9738]

## 1.17 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)

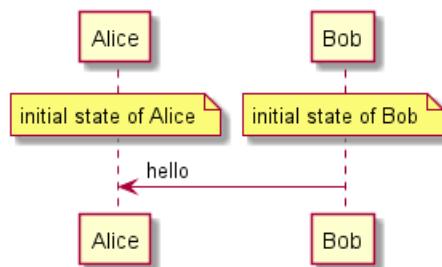
```
@startuml  
note over Alice : initial state of Alice  
note over Bob : initial state of Bob  
Bob -> Alice : hello  
@enduml
```



- 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]

## 1.18 Creole и HTML

Так же можно использовать форматирование на Creole:

```

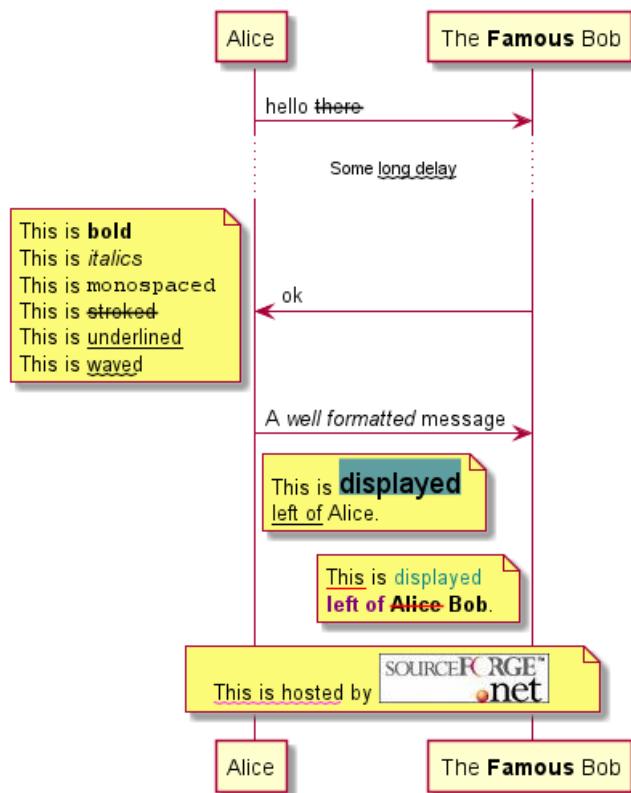
@startuml
participant Alice
participant "The **Famous** Bob" as Bob

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

```





## 1.19 Разделитель

Вы можете использовать разделитель “==”, чтобы разбить диаграмму на несколько этапов.

@startuml

```

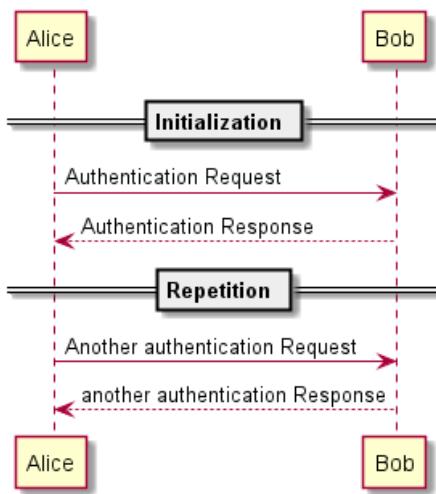
== Initialization ==
Alice -> Bob: Authentication Request
Bob --> Alice: Authentication Response

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

```

@enduml





## 1.20 Ссылки

Вы можете использовать ссылки в диаграммах с помощью ключевого слова `ref over`.

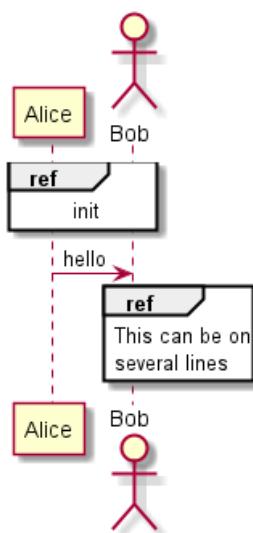
```

@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
  
```



## 1.21 Задержка на диаграммах

Вы можете использовать конструкцию `... . . .` для представления временной задержки в процессе на диаграмме. При необходимости можно снабдить задержку комментарием.

```
@startuml
```

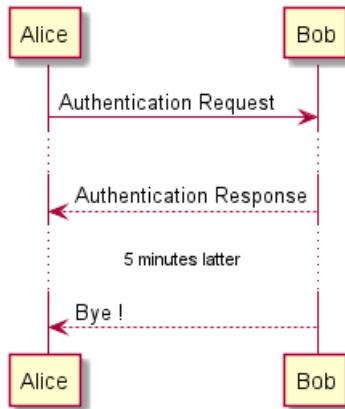


```

Alice -> Bob: Authentication Request
...
Bob --> Alice: Authentication Response
...5 minutes latter...
Bob --> Alice: Bye !

```

@enduml



## 1.22 Перенос текста

По умолчанию текст сообщения отображается в одну строку.

Перенос текста для его отображения на нескольких строках можно сделать:

- вручную, добавив в месте разрыва строки;
- автоматически, установив максимальное количество символов в строке с использованием параметра `maxMessageSize`. При этом перенос осуществляется по словам.

@startuml

```

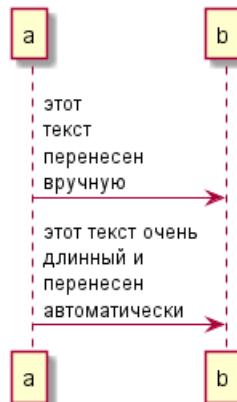
skinparam maxMessageSize 100

participant a
participant b

a -> b : \n \n \n
a -> b :

```

@enduml



## 1.23 Промежутки

Вы можете использовать ||| чтобы показать промежутки в диаграммах..

Так же возможно указать промежуток в пикселях.

```
@startuml
```

```
Alice -> Bob: message 1
Bob --> Alice: ok
|||
Alice -> Bob: message 2
Bob --> Alice: ok
||45||
Alice -> Bob: message 3
Bob --> Alice: ok
```

```
@enduml
```



## 1.24 Активация и деактивация линии существования

activate и deactivate используются чтобы обозначить активацию участника.

Линия существования появляется в момент активации участника.

activate и deactivate применяются к предыдущему сообщению.

destroy обозначает конец линии существования участника.

```
@startuml
participant User
```

```
User -> A: DoWork
activate A

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

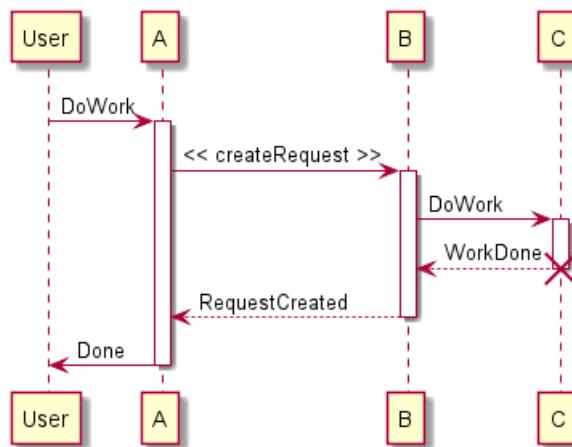
B -> C: DoWork
activate C
C --> B: WorkDone
destroy C
```



```
B --> A: RequestCreated
deactivate B
```

```
A -> User: Done
deactivate A
```

```
@enduml
```



Можно использовать вложенные линии существования, и возможно добавлять цвет линии существования

```
@startuml
participant User
```

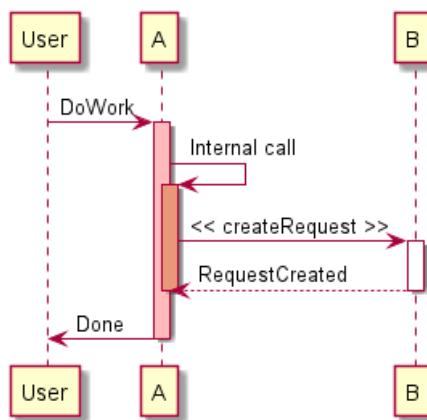
```
User -> A: DoWork
activate A #FFBBBB
```

```
A -> A: Internal call
activate A #DarkSalmon
```

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

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

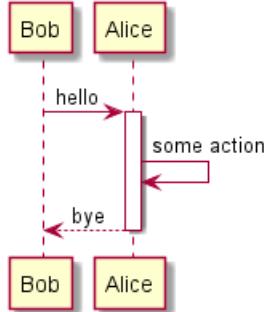
```
@enduml
```



## 1.25 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
```



## 1.26 Отображение создания участника процессом

Вы можете использовать ключевое слово `create` перед декларацией сообщения для акцентирования факта, что принимающий участник *создается* данным сообщением.

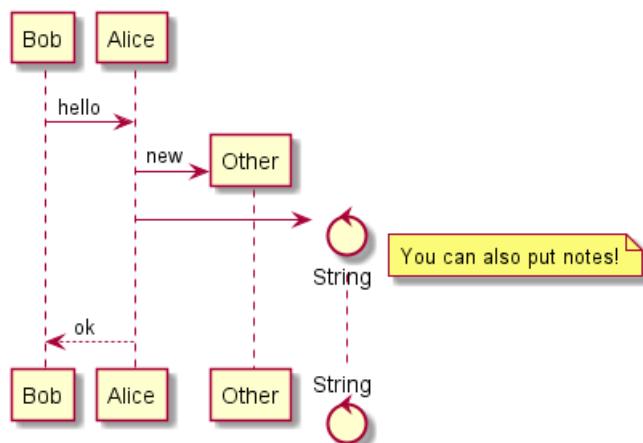
```
@startuml
Bob -> Alice : hello

create Other
Alice -> Other : new

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

Alice --> Bob : ok

@enduml
```

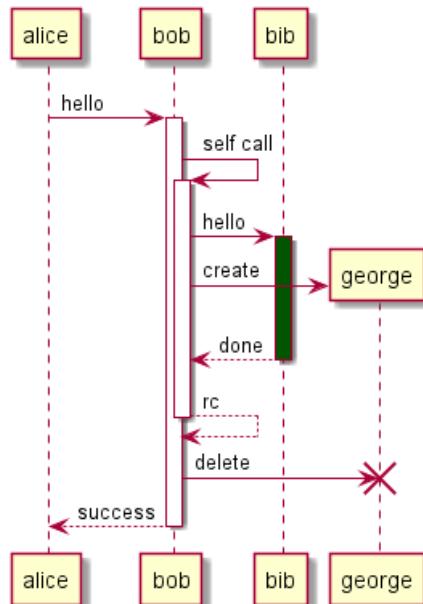


## 1.27 Shortcut syntax for activation, deactivation, creation

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

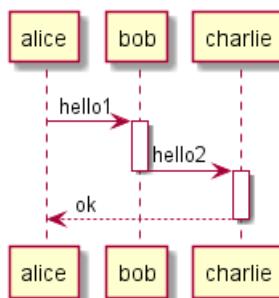
- ++ Activate the target (optionally a #color may follow this)
- -- Deactivate the source
- \*\* Create an instance of the target
- !! Destroy an instance of the target

```
@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
```



Then you can mix activation and deactivation, on same line:

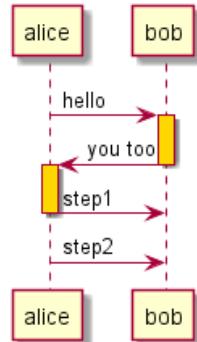
```
@startuml
alice -> bob ++ : hello1
bob -> charlie ---++ : hello2
charlie --> alice -- : ok
@enduml
```



`@startuml`



```
@startuml
alice -> bob ---+ #gold: hello
bob  -> alice ---+ #gold: you too
alice -> bob --: step1
alice -> bob : step2
@enduml
@enduml
```



[Ref. QA-4834, QA-9573 and QA-13234]

## 1.28 Входящие и исходящие сообщения

Вы можете использовать входящие или исходящие стрелки если вы хотите сфокусироваться на части диаграммы.

Используйте квадратные скобки для указания левой "[" или правой "]" стороны диаграммы

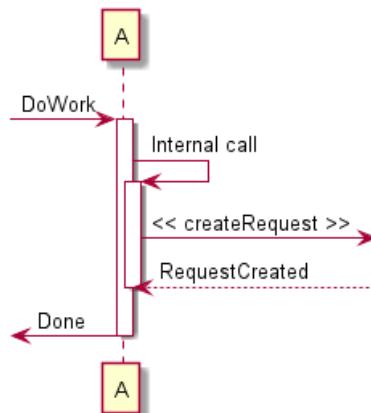
```
@startuml
[-> A: DoWork

activate A

A -> A: Internal call
activate A

A ->] : << createRequest >>

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



Вы также можете использовать следующий синтаксис:

```
@startuml
```



```
[-> Bob
[o-> Bob
[o->o Bob
[x-> Bob
```

```
[<- Bob
[x<- Bob
```

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

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

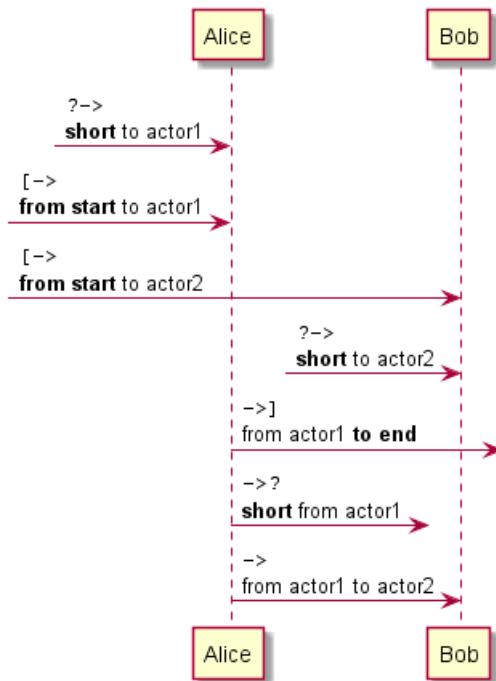


## 1.29 Short arrows for incoming and outgoing messages

You can have **short** arrows with using ?.

```
@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]

## 1.30 Anchors and Duration

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

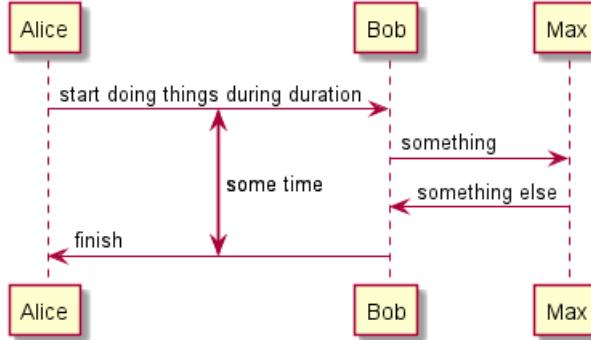
```

@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



## 1.31 Шаблоны и отметки

Можно добавить шаблоны к участникам используя << и >>.

В шаблоне вы можете добавить отмеченного участника в цветном круге используя синтаксис (X,color).

@startuml



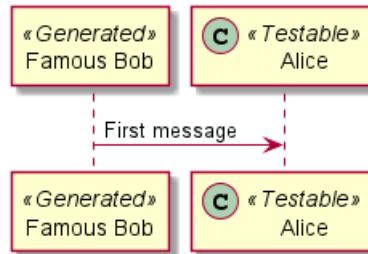
```

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

```

Bob->Alice: First message

@enduml



По умолчанию, символ *guillemet* используется для отображения шаблона. Вы можете изменить это поведение, используя skinparam guillemet:

@startuml

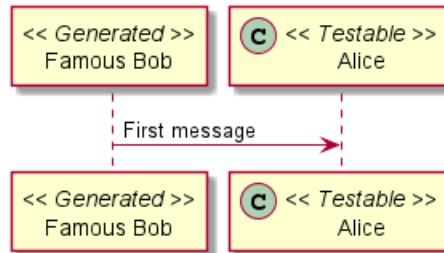
```

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

```

Bob->Alice: First message

@enduml



@startuml

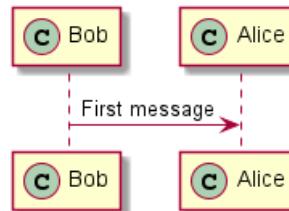
```

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

```

Bob->Alice: First message

@enduml



## 1.32 Больше информации в заголовках

Вы можете использовать форматирование на Creole для заголовков.

@startuml



```

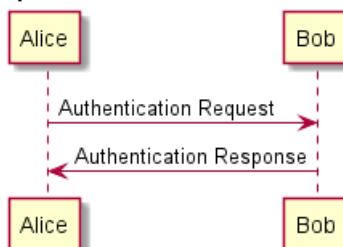
title __Simple__ **communication** example

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

@enduml

```

### Simple communication example



С помощью последовательности символов вы можете добавить перевод строки в заголовок.

```

@startuml

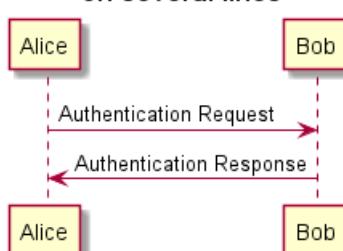
title __Simple__ communication example\non several lines

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

@enduml

```

### Simple communication example on several lines



Вы также можете задать заголовок на нескольких строках, используя ключевые слова `title` и `end title`.

```

@startuml

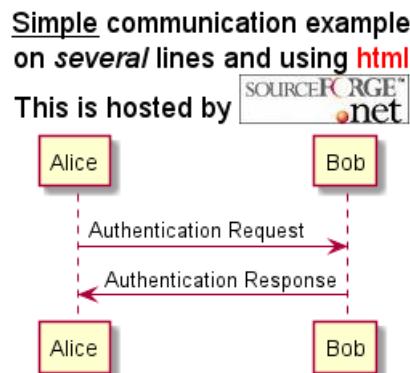
title
<u>Simple</u> communication example
on <i>several</i> lines and using <font color=red>html</font>
This is hosted by <img:sourceforge.jpg>
end title

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

@enduml

```





### 1.33 Группировка участников

Можно создать прямоугольник вокруг участников, используя команды `box` и `end box`.

Вы можете задать опциональный заголовок и цвет фона, после команды `the box`.

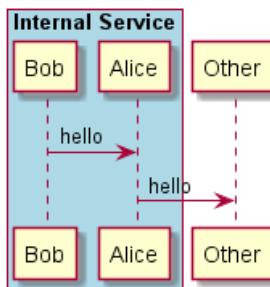
`@startuml`

```

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

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

`@enduml`



### 1.34 Удаление футера

Вы можете использовать ключевое слово `hide footbox` для удаления футера из диаграммы.

`@startuml`

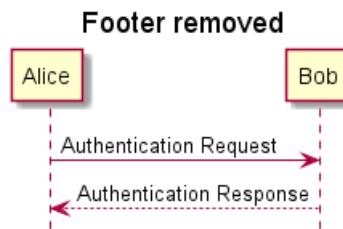
```

hide footbox
title Footer removed

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

`@enduml`





### 1.35 Skinparam

Вы можете использовать команду skinparam для изменения шрифтов и цветов диаграммы

Вы можете использовать данную команду :

- В определении диаграммы, как любую другую команду,
- В подключеннем файле,
- В конфигурационном файле, указанном в командной строке в задании ANT.

Вы можете изменить другие параметры отображения, как видно из следующих примеров:

```

@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

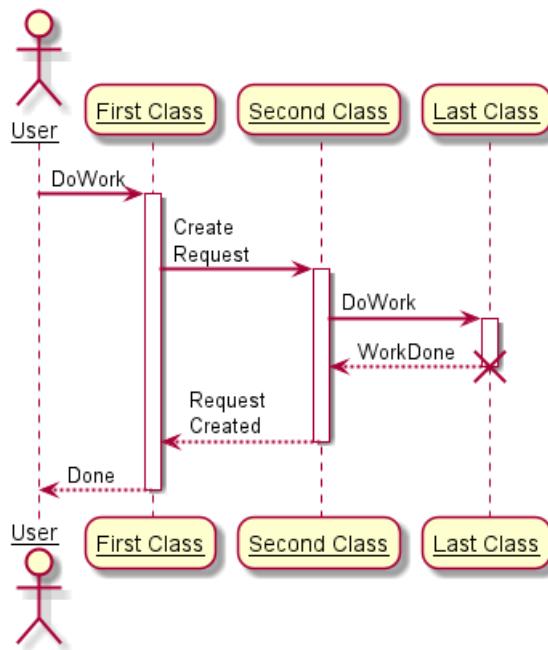
B --> A: Request Created
deactivate B

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

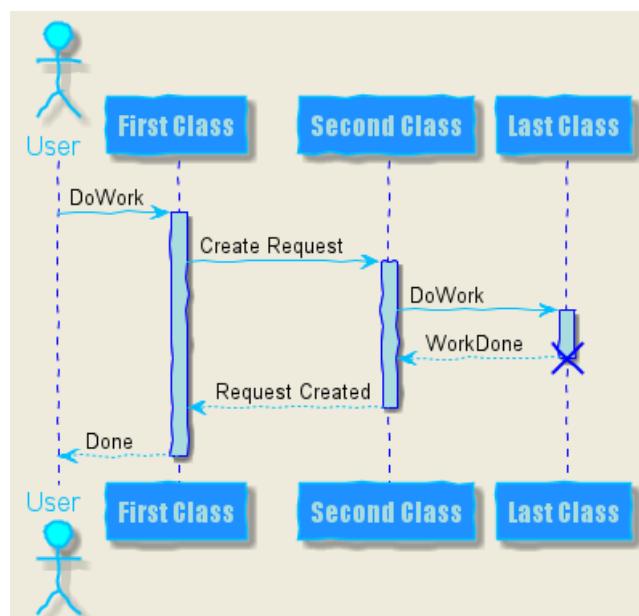
```



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

```
A --> User: Done
deactivate A
```

```
@enduml
```

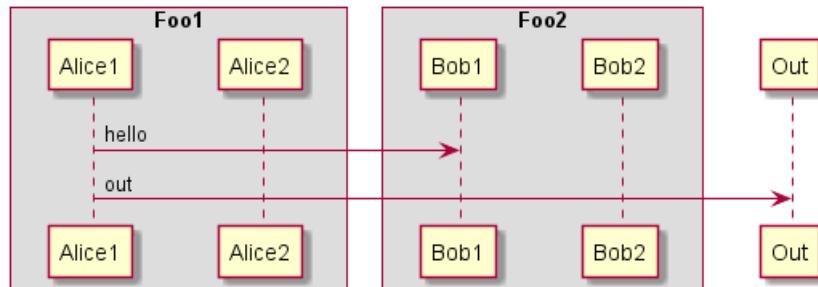


## 1.36 Изменение отступов

Вы можете изменить некоторые настройки отступов

```
@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
```



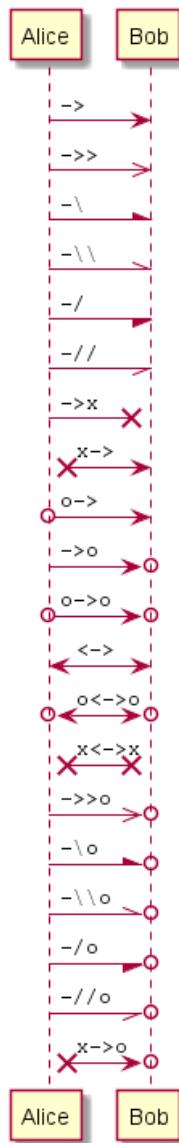
## 1.37 Appendix: Examples of all arrow type

### 1.37.1 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





### 1.37.2 Incoming and outgoing messages (with '[', ']')

### 1.37.3 Incoming messages (with '[')

```

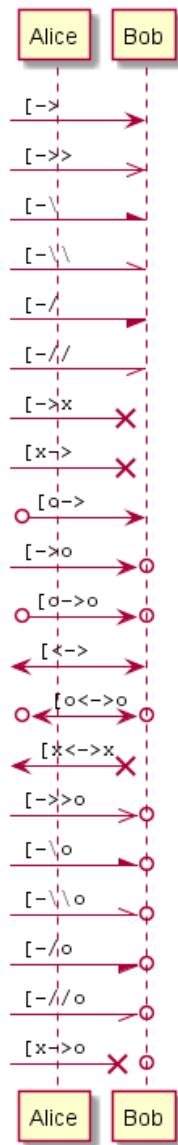
@startuml
participant Alice as a
participant Bob   as b
[->      b : ""[->    """
[-->     b : ""[-->   """
[-\      b : ""[-\    """
[-\\ \    b : ""[-\\ \\ \"""
[-/      b : ""[-/    """
[-//     b : ""[-//   """
[->x    b : ""[->x """
[x->    b : ""[x-> """
[o->    b : ""[o-> """
[->o    b : ""[->o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

```



#### 1.37.4 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->] """

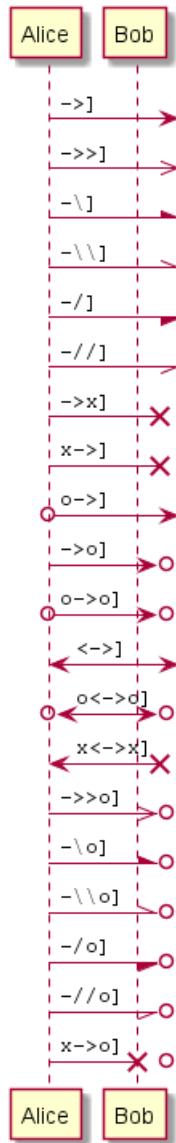
```



```

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

```



### 1.37.5 Short incoming and outgoing messages (with '?')

### 1.37.6 Short incoming (with '?')

```

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

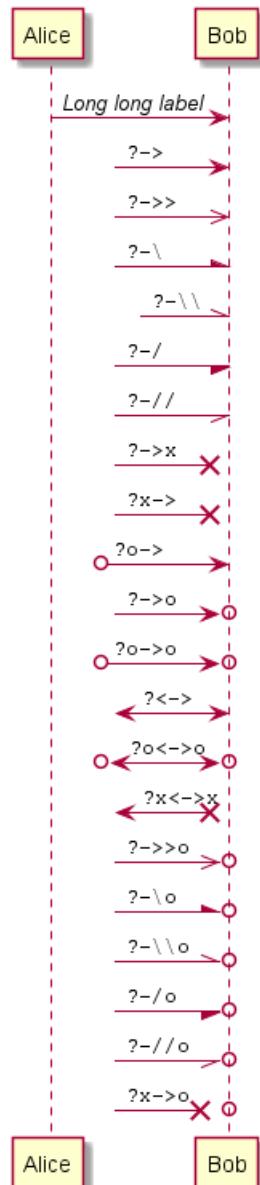
```



```

?->>    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

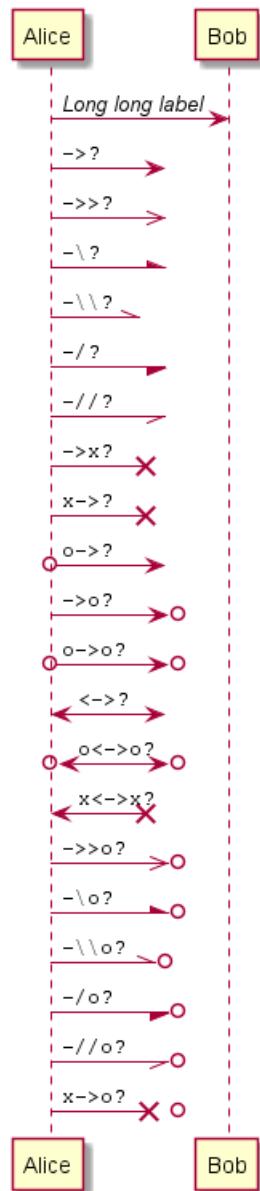
```



### 1.37.7 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
```

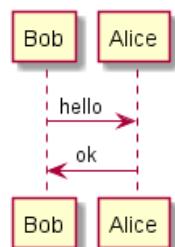




## 1.38 Specific SkinParameter

### 1.38.1 By default

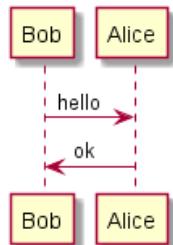
```
@startuml
Bob -> Alice : hello
Alice -> Bob : ok
@enduml
```



### 1.38.2 LifelineStrategy

- nosolid (*by default*)

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

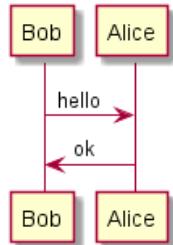


[Ref. QA-9016]

- 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
```



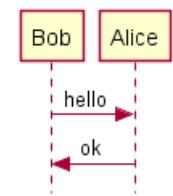
[Ref. QA-2794]

### 1.38.3 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]

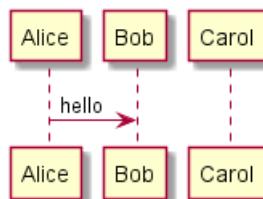


### 1.39 Hide unlinked participant

By default, all participants are displayed.

```
@startuml  
participant Alice  
participant Bob  
participant Carol
```

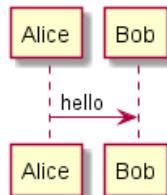
```
Alice -> Bob : hello  
@enduml
```



But you can hide unlinked participant.

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

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



[Ref. QA-4247]



## 2 Диаграмма прецедентов

Рассмотрим несколько примеров:

Заметьте, что Вы можете отключить тени, используя команду `skinparam shadowing false`.

### 2.1 Прецеденты

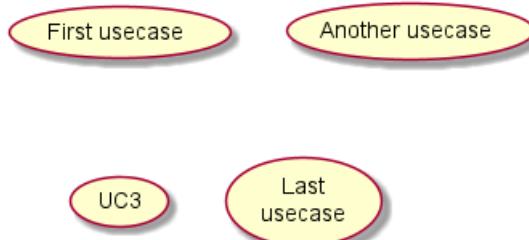
Прецеденты заключаются в две скобки (потому что две скобки выглядят как овал).

Вы можете использовать `usecase` для создания прецедента. также вы можете создать псевдоним, используя `as keyword`. Этот псевдоним будет использоваться позже во время определения связей

```
@startuml
```

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

```
@enduml
```



### 2.2 Актёры

Определить актёра можно заключив его значение между дветочиями.

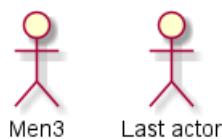
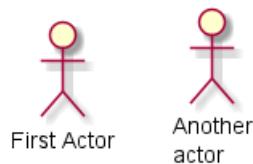
Также Вы можете использовать ключевое слово `actor` для определения актёра. И вы можете создать псевдоним, используя ключевое слово `as`. Этот псевдоним будет использован позднее, при определении отношений.

Мы увидим, что определения актеров не обязательны.

```
@startuml
```

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

```
@enduml
```



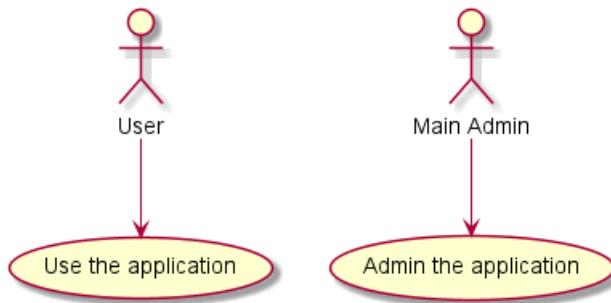
## 2.3 Change Actor style

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.

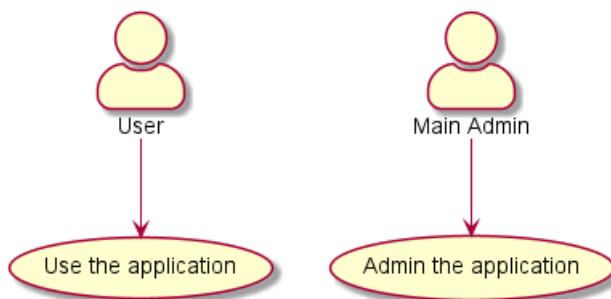
### 2.3.1 Stick man (*by default*)

```
@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
```

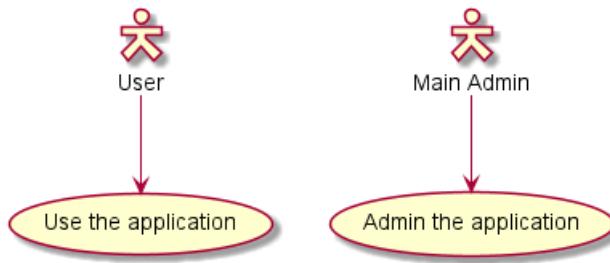


[Ref. QA-10493]

### 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 Описание прецедентов

Если вы хотите описание на несколько строк, можете использовать кавычки.

Вы также можете использовать следующие разделители: -- .. == \_\_\_. И вы можете вставлять заголовки внутри разделителей.

@startuml

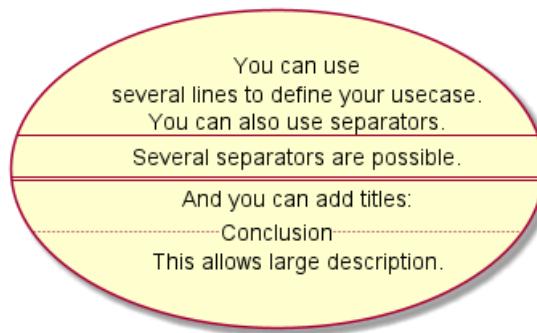
```

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



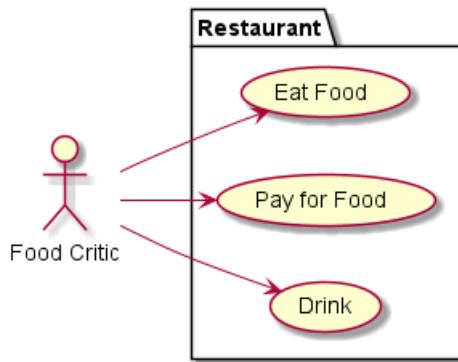
## 2.5 Использование пакетов

Чтобы сгруппировать актёров или прецеденты, можно использовать пакеты.

```

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

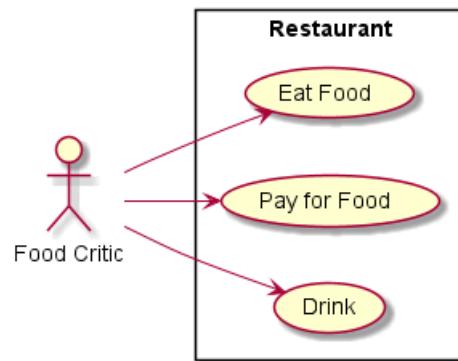




Для изменения внешнего вида пакета можно воспользоваться rectangle.

```

@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 Простой пример

Для соединения актеров и прецедентов, используется стрелка -->.

Чем больше тире – в стрелке, тем она длиннее. Вы можете добавить метку на стрелку, добавив символ : при определении стрелки.

В этом примере, вы можете видеть, что *User* не определён ранее и используется как актёр.

```

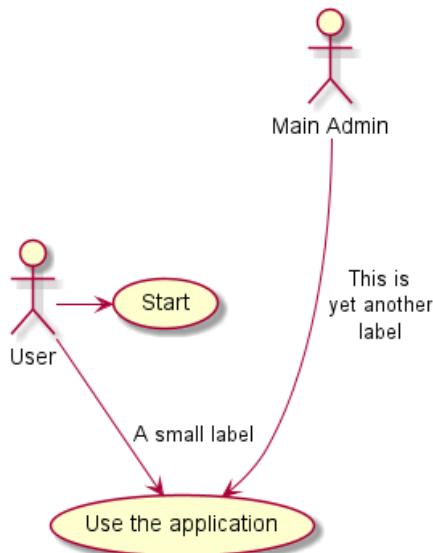
@startuml

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

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

@enduml
  
```





## 2.7 Расширение

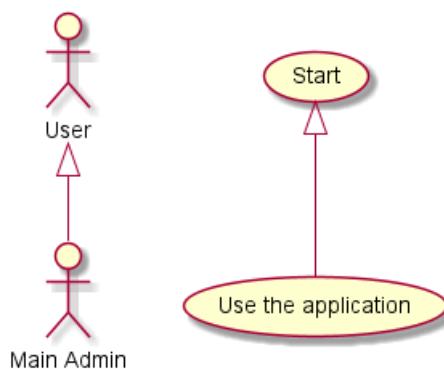
Если один актёр/прецедент расширяют другой, вы можете использовать символ <|--.

```

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

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

@enduml
  
```



## 2.8 Использование заметок

Вы можете использовать ключевые слова `note left of`, `note right of`, `note top of`, `note bottom of` чтобы создать заметку относящуюся к одному объекту.

Заметка так же может быть создана с помощью ключевого слова `note`, а затем прикреплена к другому объекту используя символ ...

```

@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)
```

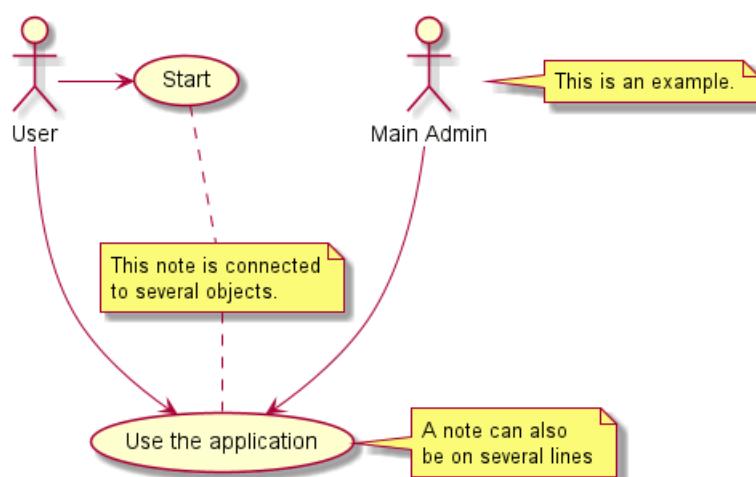
```
  A note can also  
  be on several lines  
end note
```

```
note "This note is connected\nto several objects." as N2
```

```
(Start) .. N2
```

```
N2 .. (Use)
```

```
@enduml
```



## 2.9 Шаблоны

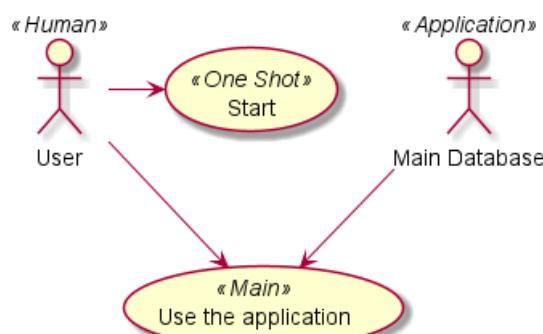
Вы можете добавить шаблоны когда определяете актёров и прецеденты, используя << и >>.

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

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

```
MySql --> (Use)
```

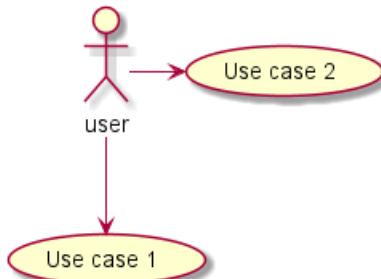
```
@enduml
```



## 2.10 Смена направления стрелок

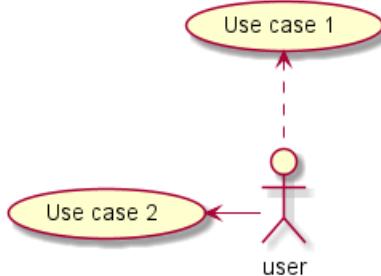
По умолчанию, связи между классами имеют два тире -- и вертикально ориентированы. можно использовать горизонтальные связи, с помощью написание одного тире (или точки), вот так:

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



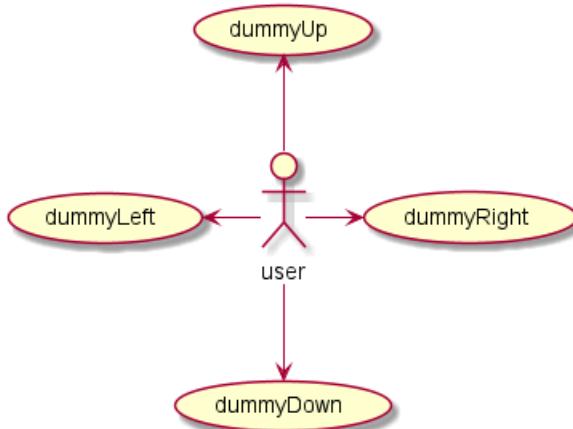
Вы так же можете изменить направление с помощью переворачивания связи:

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



Так же возможно сменить направление добавляя ключевые слова left, right, up или down внутри стрелки:

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



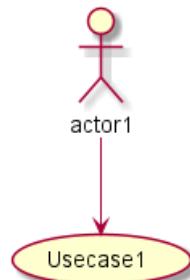
Вы можете записать короче, используя только первый символ названия направления (например, `-d-` вместо `-down-`) или первые два символа (`-do-`).

Пожалуйста, помните, что Вы не должны использовать эту функциональность без реальной необходимости: *GraphViz* обычно даёт хороший результат без дополнительных настроек.

## 2.11 Разделение диаграмм

Ключевое слово `newpage` используется для разделения диаграмм на несколько страниц или изображений.

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

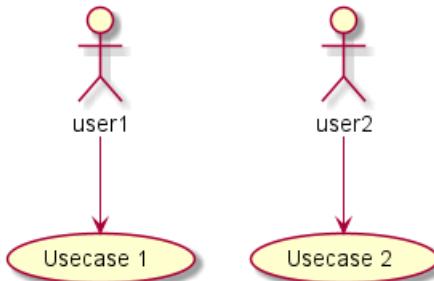


## 2.12 Направление слева направо

Общее поведение по умолчанию - построение диаграмм сверху вниз.

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

@enduml
```



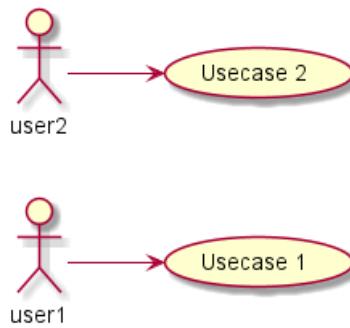
Вы можете изменить направление на слева направо используя команду `left to right direction`. Часто результат с таким направлением выглядит лучше.

```
@startuml

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

@enduml
```





## 2.13 Skinparam

Вы можете использовать команду `skinparam` для изменения шрифтов и цветов диаграммы

Вы можете использовать данную команду :

- В определении диаграммы, как любую другую команду,
- В подключном файле,
- В конфигурационном файле, указанном в командной строке в задании ANT.

Вы можете задать цвет или шрифт для актёров или прецедентов с шаблонами.

```
@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
}

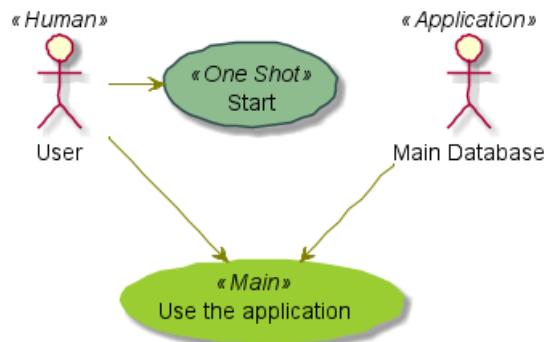
User << Human >>
:Main Database: as MySql << Application >>
(Start) << One Shot >>
(Use the application) as (Use) << Main >>

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

MySql --> (Use)
```

```
@enduml
```

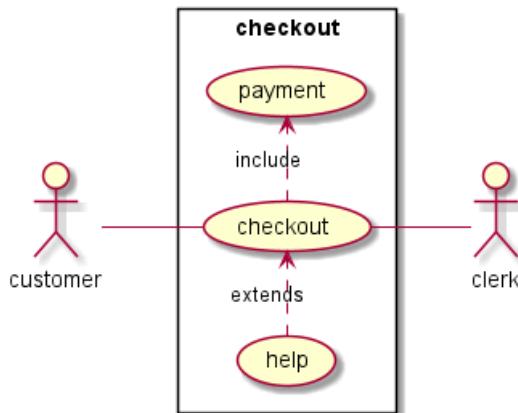




## 2.14 Полноценный пример

```

@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

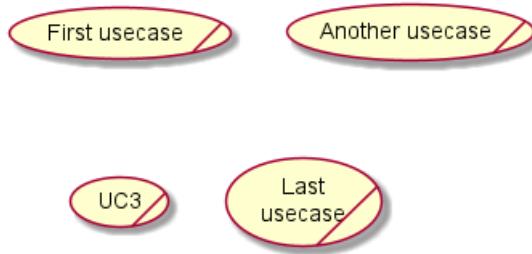
```

@startuml

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

@enduml
  
```





### 2.15.2 Business Actor

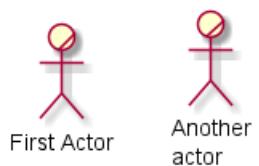
@startuml

```

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

```

@enduml



[Ref. QA-12179]

### 2.16 Change arrow color and style (inline style)

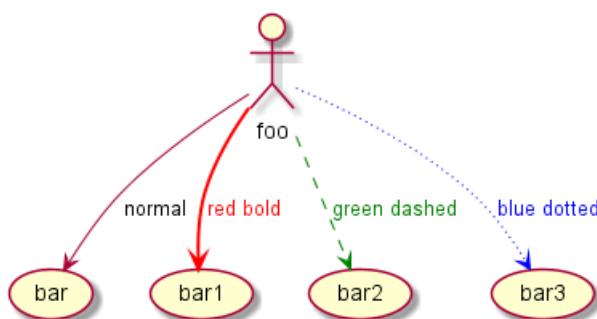
You can change the color or style of individual arrows using the inline following notation:

- #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

```



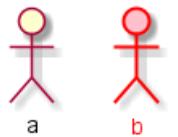
[Ref. QA-3770 and QA-3816] [See similar feature on deployment-diagram or class diagram]

## 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
```



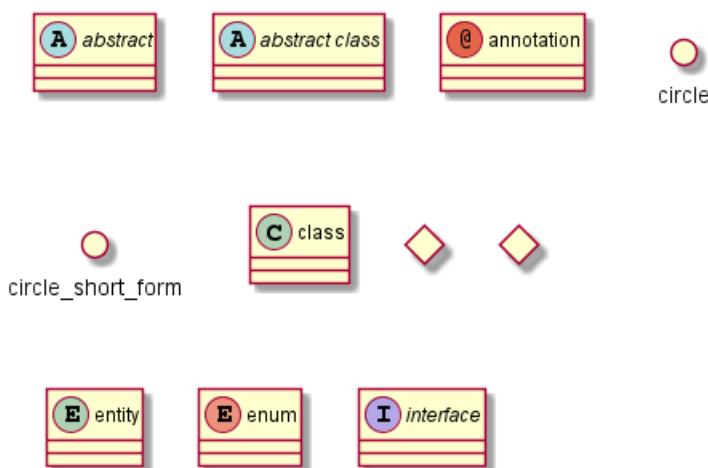
[Ref. QA-5340 and adapted from QA-6852]



## 3 Диаграмма классов

### 3.1 Declaring element

```
@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
```



### 3.2 Отношения между классами

Отношения между классами определяются с помощью следующих символов:

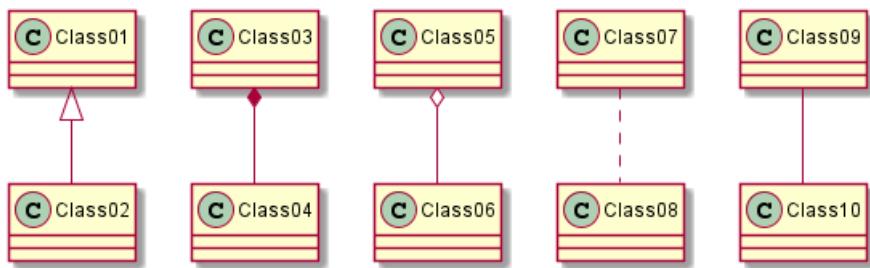
Type	Symbol	Drawing
Extension	< --	
Composition	*---	
Aggregation	o--	

Можно заменить – на . . ., чтобы создать пунктирную линию.

Зная эти правила можно нарисовать следующие изображения:

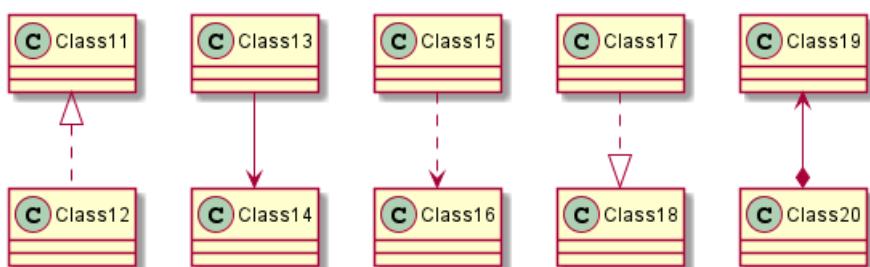
```
@startuml
Class01 <|-- Class02
Class03 *--- Class04
Class05 o-- Class06
Class07 .. Class08
Class09 -- Class10
@enduml
```





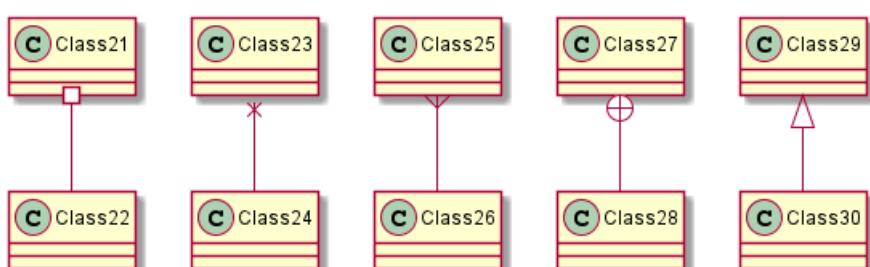
```

@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 Метки на отношениях

Для отношения можно добавить метку. Делается это с помощью указания символа `:`, после которого указывается текст метки.

Для указания количества элементов на каждой стороне отношения можно использовать двойные кавычки `"..."`.

```

@startuml

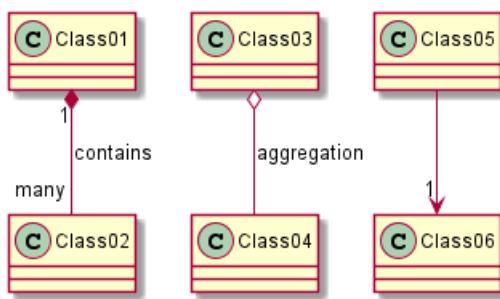
Class01 "1" *-- "many" Class02 : contains

Class03 o-- Class04 : aggregation

Class05 --> "1" Class06
  
```



@enduml



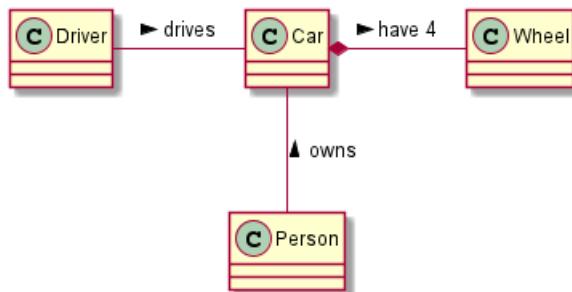
Вы можете добавить дополнительные стрелки < или > в начале или в конце метки, указывающие на использование одного из объектов другим объектом.

@startuml  
class Car

```

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

@enduml



## 3.4 Добавление методов

Для объявления полей и методов вы можете использовать символ :, после которого указывается имя поля или метода.

Для определения того, что вы указали метод или поле, система ищет скобки.

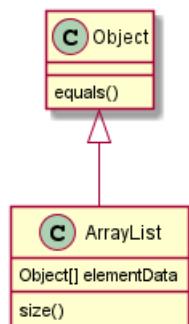
```

@startuml
Object <|-- ArrayList

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

@enduml





Также можно группировать все поля и методы между фигурными скобками {}.

Синтаксис порядка описания типа/имени довольно гибок.

```

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

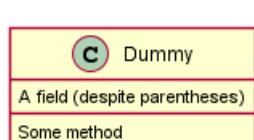
class Flight {
    flightNumber : Integer
    departureTime : Date
}
@enduml
  
```



You can use {field} and {method} modifiers to override default behaviour of the parser about fields and methods.

```

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



## 3.5 Указание видимости

Определяя методы и поля, вы можете использовать символы указания видимости, приведённые в таблице ниже:

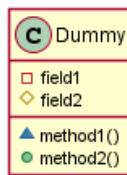
Character	Icon for field	Icon for method	Visibility
-	□	■	private
#	◊	◊	protected
~	△	△	package private
+	○	●	public

```
@startuml
```



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

@enduml
```



Убрать значки можно командой `skinparam classAttributeIconSize 0`:

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

@enduml
```

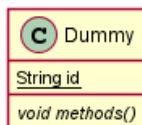


## 3.6 Абстрактные и статические

Вы можете определить статические или абстрактные методы и поля используя модификаторы `{static}` и `{abstract}` соответственно.

Эти модификаторы могут располагаться как в начале так и в конце строки. Вы так же можете использовать `{classifier}` как замену для `{static}`.

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



## 3.7 Расширенное тело класса

По умолчанию, методы и поля автоматически группируются PlantUML. Вы можете использовать разделители, чтобы определить собственный порядок полей и методов. Можно использовать следующие разделители:

`-- .. == --`



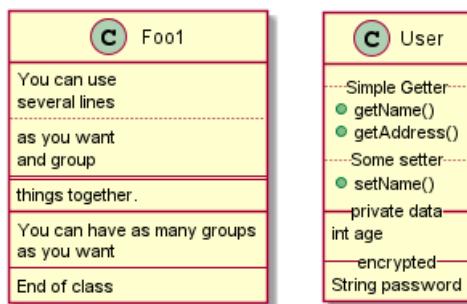
Вы также можете использовать заголовки внутри разделителей:

```
@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
```



## 3.8 Заметки и шаблоны

Шаблоны задаются ключевым словом `class`, `<<` и `>>`.

Также вы можете создать заметку, используя ключевые слова `note left of`, `note right of`, `note top of`, `note bottom of`.

Вы также можете добавить заметку к последнему определённому классу, используя `note left`, `note right`, `note top`, `note bottom`.

Ключевым словом `note` легко создать заметку без привязи, а после, используя символ `..`, привязать её к другим объектам.

```
@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

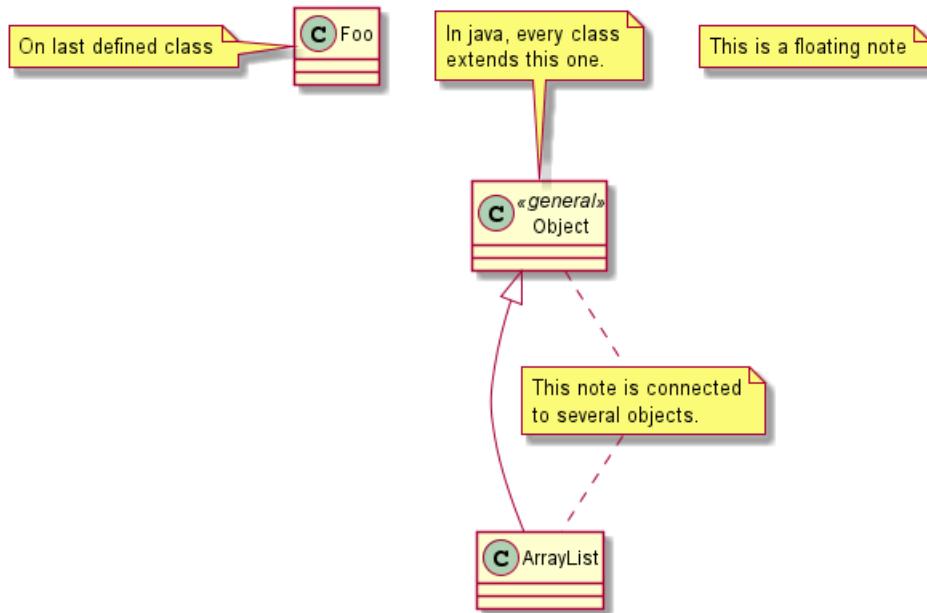
```

```

class Foo
note left: On last defined class

@enduml

```



### 3.9 Больше о заметках

Также допускается использование некоторых HTML-тегов, таких как:

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

Заметка может быть из нескольких строк.

Можно определить заметку для класса, заданного последним, с помощью `note left`, `note right`, `note top`, `note bottom`.

```
@startuml
```

```

class Foo
note left: On last defined class

note top of Object
    In java, <size:18>every</size> <u>class</u>

```



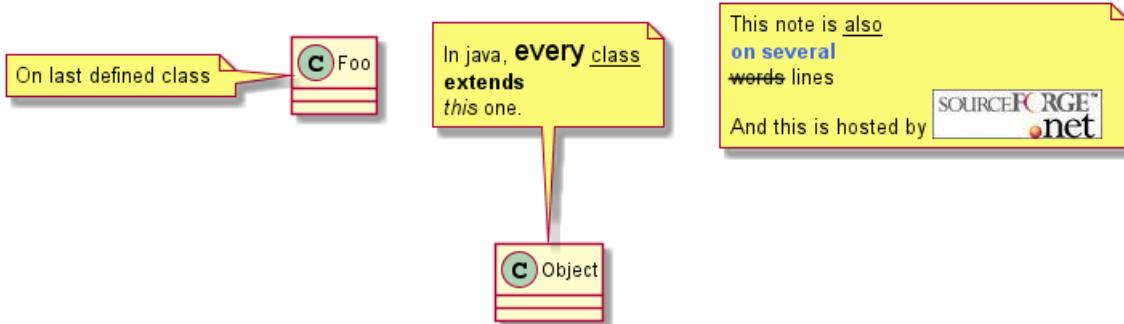
```

<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

```



### 3.10 Note on field (field, attribute, member) or method

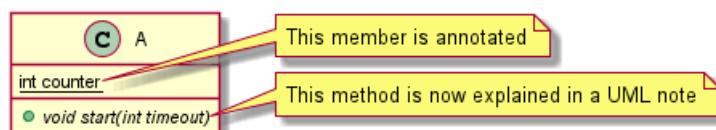
It is possible to add a note on field (field, attribute, member) or on method.

#### 3.10.1 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

```



#### 3.10.2 Note on method with the same name

```

@startuml
class A {
{static} int counter
+void {abstract} start(int timeouts)
+void {abstract} start(Duration timeout)
}
note left of A::counter
This member is annotated

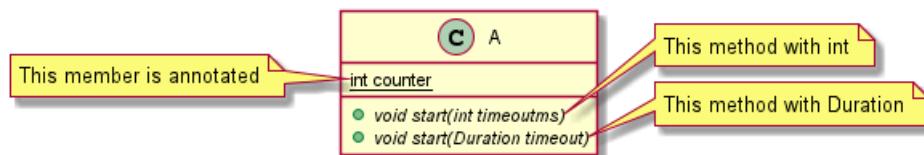
```



```

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]

### 3.11 Заметки на связях

Возможно добавить заметку на связь, сразу после определения связи, используя `note on link`.

Вы также можете использовать `note left on link`,`note right on link`,`note top on link`,`note bottom on link` если вы хотите изменить относительную позицию заметки с надписью.

```
@startuml
```

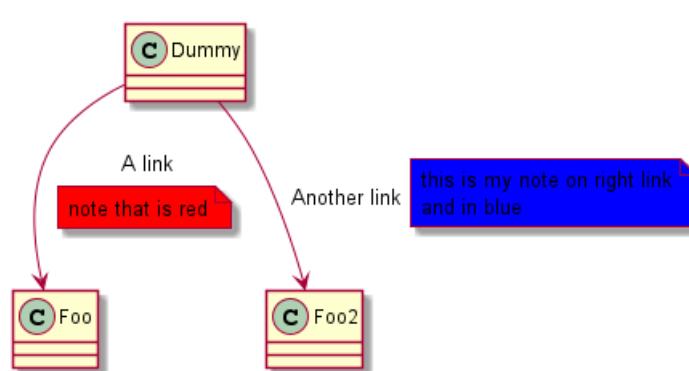
```

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

```



### 3.12 Абстрактные классы и интерфейсы

Вы можете определить класс как абстрактный, используя ключевые слова `abstract` или `abstract class`.

Классы будут нарисованы курсивом.

Вы также можете использовать ключевые слова `interface`, `annotation` и `enum`.

```
@startuml
```

```
abstract class AbstractList
```



```

abstract AbstractCollection
interface List
interface Collection

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

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

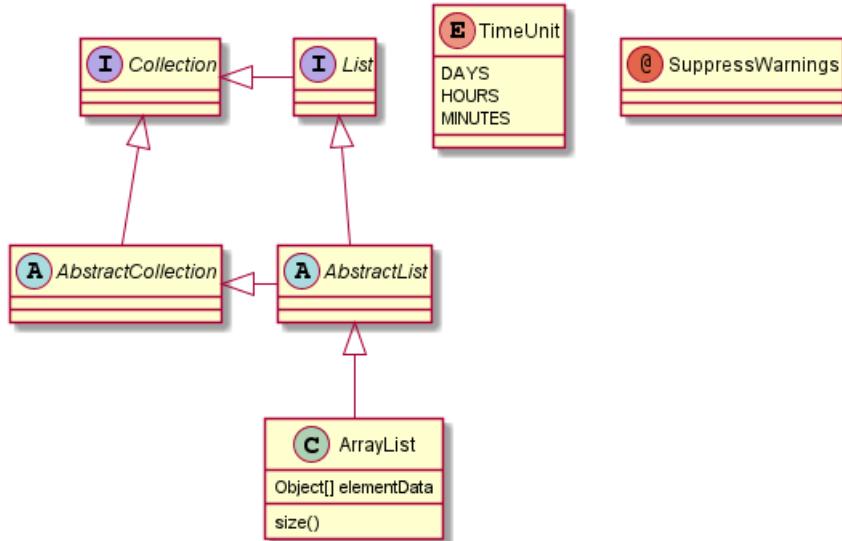
class ArrayList {
    Object[] elementData
    size()
}

enum TimeUnit {
    DAYS
    HOURS
    MINUTES
}

@annotation SuppressWarnings

@enduml

```



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

### 3.13 Использование не буквенных символов

Если вы хотите использовать не буквенные символы в названии класса (или другого объекта), вы можете использовать 2 способа :

- Использовать ключевое слово `as` в определении класса
- Поставить кавычки `" "` вокруг имени класса

```

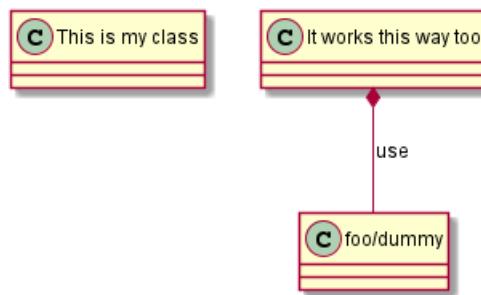
@startuml
class "This is my class" as class1
class class2 as "It works this way too"

class2 *-- "foo/dummy" : use

```



@enduml



### 3.14 Скрытие атрибутов, методов...

Вы можете управлять видимостью классов с помощью команды `hide/show`.

Базовая команда это - `hide empty members`. Команда скроет атрибуты или методы, если они пусты.

Вместо `empty members`, вы можете использовать:

- `empty fields` или `empty attributes` для пустых полей,
- `empty methods` для пустых методов,
- `fields` или `attributes`, которые скрывают поля, даже если они были описаны,
- `methods`, которые скрывают методы, даже если они были описаны,
- `members`, которые скрывают поля и методы, даже если они были описаны,
- `circle` для круглых символов перед именем класса,
- `stereotype` для шаблона.

Вы также можете указать ключевое слово, сразу за `hide` или `show`:

- `class` для всех классов,
- `interface` для всех интерфейсов,
- `enum` для всех перечислений,
- `<<foo1>>` для классов, к которым применен шаблон с помощью `foo1`,
- имя существующего названия класса.

Для определения большого набора, состоящего из правил и исключений, можно использовать несколько команд `show/hide`.

@startuml

```

class Dummy1 {
    +myMethods()
}

class Dummy2 {
    +hiddenMethod()
}

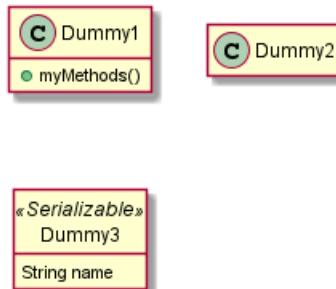
class Dummy3 <<Serializable>> {
String name
}

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



```
show <<Serializable>> fields
```

```
@enduml
```



## 3.15 Скрытие классов

Вы также можете использовать команду `show/hide`, чтобы скрывать классы.

Это может быть полезно, если вы определяете большой !подключенный файл, и если вы хотите скрыть некоторые классы после включения.

```
@startuml
```

```

class Foo1
class Foo2

Foo2 *-- Foo1

hide Foo2

```

```
@enduml
```



## 3.16 Remove classes

You can also use the `remove` commands to remove classes.

This may be useful if you define a large !included file, and if you want to remove some classes after file inclusion.

```
@startuml
```

```

class Foo1
class Foo2

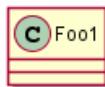
Foo2 *-- Foo1

remove Foo2

```

```
@enduml
```

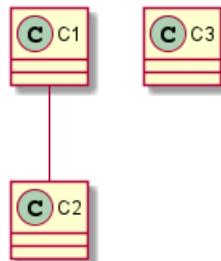




### 3.17 Hide or Remove unlinked class

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]

### 3.18 Использование дженериков

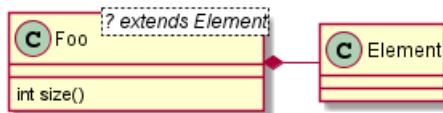
Вы также можете использовать скобки < и > чтобы указать на использование дженериков в классе.

@startuml

```

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

@enduml



Вы можете отключить отрисовку этих элементов, используя команду `skinparam genericDisplay old`.

### 3.19 Определение метки

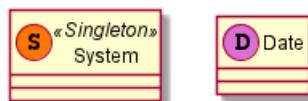
Обычно, метка с буквой (C, I, E or A) используется для классов, интерфейсов, перечисления и абстрактных классов.

Но также вы можете использовать свою собственную метку для класса, когда создаёте шаблон, добавляя одну букву и цвет, как в этом примере:

@startuml

```

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



### 3.20 Пакеты

Вы можете определить пакет, используя ключевое слово `package`, с возможностью объявить ещё и цвет его фона, (используя html-код цвета или его имя).

Обратите внимание, что определения пакета могут быть вложенными.

@startuml

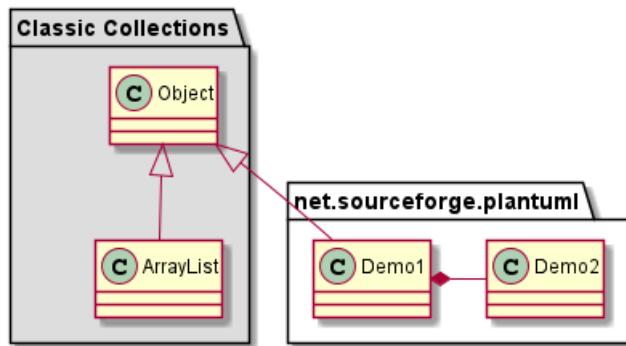
```

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



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

@enduml



### 3.21 Стили пакетов

Доступны различные стили для пакетов.

Можно задать стили по умолчанию с помощью команды: `skinparam packageStyle`, или применить шаблоны на пакет:

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

package foo2 <<Rectangle>> {
    class Class2
}

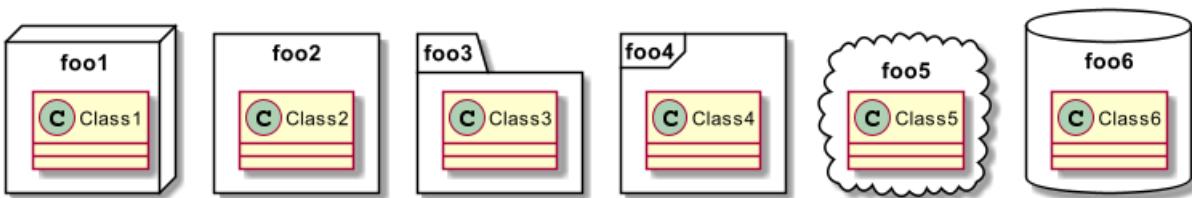
package foo3 <<Folder>> {
    class Class3
}

package foo4 <<Frame>> {
    class Class4
}

package foo5 <<Cloud>> {
    class Class5
}

package foo6 <<Database>> {
    class Class6
}

@enduml
```



Вы также можете определить связи между пакетами, как в данном примере:

```
@startuml

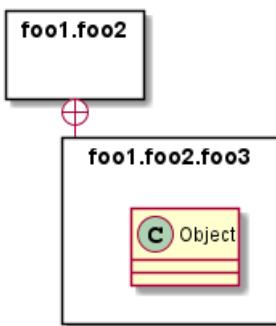
skinparam packageStyle rectangle

package foo1.foo2 {
}

package foo1.foo2.foo3 {
    class Object
}

foo1.foo2 +-- foo1.foo2.foo3

@enduml
```



## 3.22 Пространства имён

В пакетах, имя класса является уникальным идентификатором этого класса. Это значит, что у вас не может быть двух одноименных классов в разных блоках.

В этом случае, вам следует использовать пространства имен вместо пакетов.

Вы можете ссылаться на классы из других пространств имён по их полному определению. Классы из пространства имён по умолчанию определяются ведущей точкой.

Обратите внимание, что вы не обязаны явно создавать пространство имен: полностью определенный класс автоматически попадает в правильное пространство имен.

```
@startuml

class BaseClass

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

    .BaseClass <|- Meeting
}

namespace net.foo {
```



```

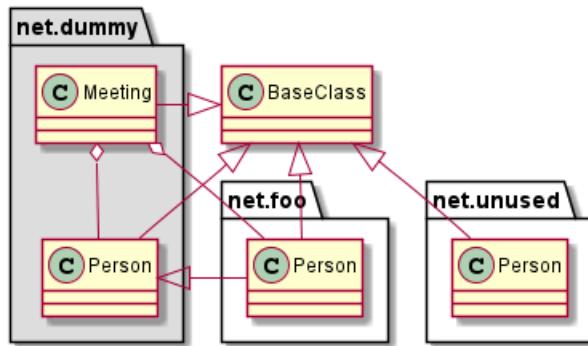
net.dummy.Person <|-- Person
.BaseClass <|-- Person

net.dummy.Meeting o-- Person
}

BaseClass <|-- net.unused.Person

@enduml

```



### 3.23 Автоматическое создание пространств имён

Вы также можете задать другой разделитель (не точку) используя команду : `set namespaceSeparator ???.`

```
@startuml
```

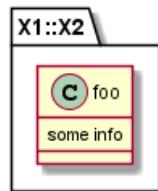
```

set namespaceSeparator ::

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

```

```
@enduml
```



Вы можете отключить автоматическое создание пакетов используя команду `set namespaceSeparator none`.

```
@startuml
```

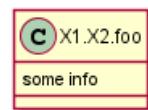
```

set namespaceSeparator none

class X1.X2.foo {
    some info
}

```

```
@enduml
```

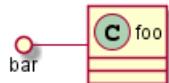


## 3.24 Lollipop интерфейс

Вы также можете задать lollipops интерфейсы на классах, используя следующий синтаксис:

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

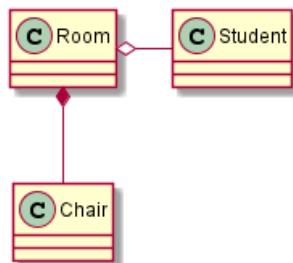
```
@startuml
class foo
bar ()- foo
@enduml
```



## 3.25 Изменение направления стрелок

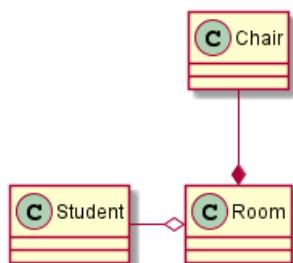
По умолчанию, связи между классами имеют два тире -- и вертикально ориентированы. Возможно создать горизонтальную связь, используя одно тире (or dot) вот так:

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



Вы можете изменить направление перевернув связь:

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

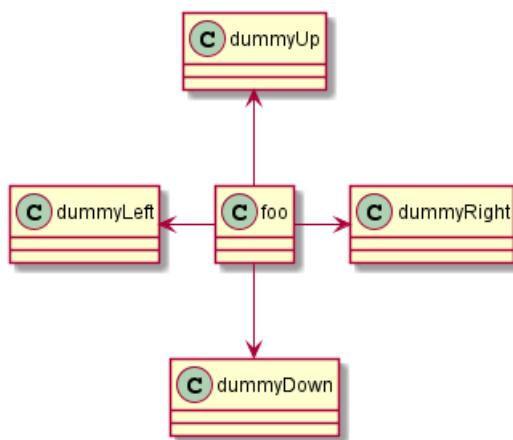


Также возможно изменять направление стрелок, добавляя ключевые слова left, right, up или down внутри стрелки:

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



@enduml



Вы можете укоротить запись, используя только первую букву направления (например, `-d-` вместо `-down-`) или две первые буквы (`-do-`).

Заметьте, что вам не стоит пользоваться этой функциональностью без особой надобности: *Graphviz* обычно предоставляет хорошие результаты без дополнительной настройки.

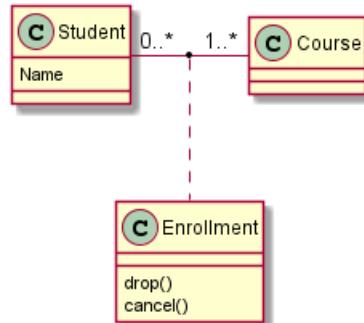
## 3.26 Ассоциация классов

Вы можете задать *ассоциацию класса* после того, как была задана связь между двумя классами, как в примере:

```

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

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



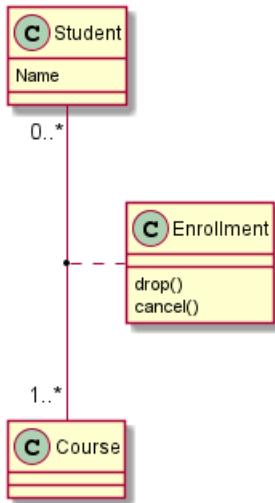
Вы можете задать это в другом направлении:

```

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



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



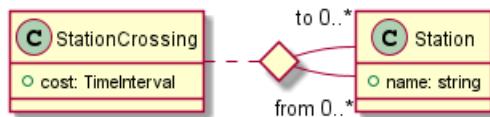
### 3.27 Association on same classe

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

class StationCrossing {
    +cost: TimeInterval
}

<> diamond

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



[Ref. Incubation: Associations]

### 3.28 Skinparam

Вы можете использовать команду `skinparam` для изменения шрифтов и цветов диаграммы

Вы можете использовать данную команду :

- В определении диаграммы, как любую другую команду,
- В подключенном файле,
- В конфигурационном файле, указанном в командной строке в задании ANT.

```
@startuml
```



```

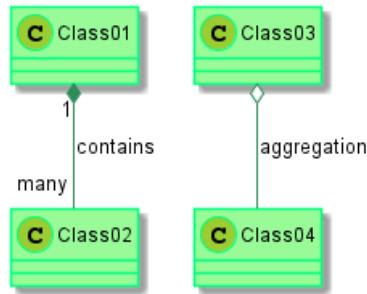
skinparam class {
BackgroundColor PaleGreen
ArrowColor SeaGreen
BorderColor SpringGreen
}
skinparam stereotypeCBackgroundColor YellowGreen

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

Class03 o-- Class04 : aggregation

@enduml

```



### 3.29 Шаблоны со Skinparam

Вы можете задать цвет или шрифт для шаблонов классов.

```

@startuml

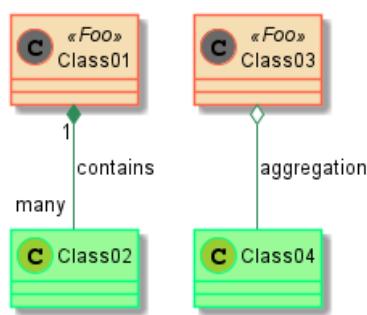
skinparam class {
BackgroundColor PaleGreen
ArrowColor SeaGreen
BorderColor SpringGreen
BackgroundColor<<Foo>> Wheat
BorderColor<<Foo>> Tomato
}
skinparam stereotypeCBackgroundColor YellowGreen
skinparam stereotypeCBackgroundColor<< Foo >> DimGray

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

Class03 o-- Class04 : aggregation

@enduml

```



### 3.30 Цветовой градиент

Можно объявить индивидуальный цвет для классов или примечаний, используя # обозначения.

Можно использовать как стандартные названия цветов, так и RGB-код.

Так же возможно использование градиента для фона, используя следующие символы для разделения пары цветов:

- |,
- /,
- \,
- or -

в зависимости от направления градиента

Например так :

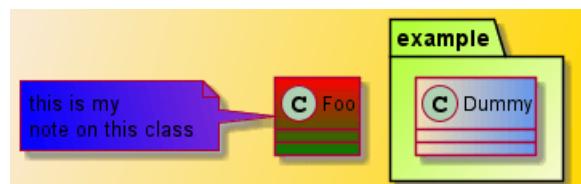
```
@startuml

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
```



### 3.31 Помощь в расположении классов

Sometimes, the default layout is not perfect...

You can use `together` keyword to group some classes together : the layout engine will try to group them (as if they were in the same package).

You can also use `hidden` links to force the layout.

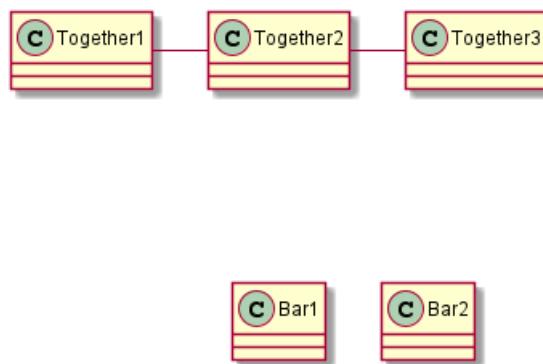
```
@startuml

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



```
Bar1 -[hidden]> Bar2
```

```
@enduml
```



### 3.32 Разделение больших файлов

Иногда могут получиться очень большие файлы изображений.

Вы можете использовать команду page (*hpages*)x(*vpages*) чтобы разделить создаваемое изображение на несколько файлов (страниц) :

*hpages* - это задание числа горизонтальных страниц, и *vpages* - это задание числа вертикальных страниц..

Здесь также можно использовать специфику *skinparam* настроек как цвета разделённых страниц, так и их границы (смотри пример).

```

@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
}

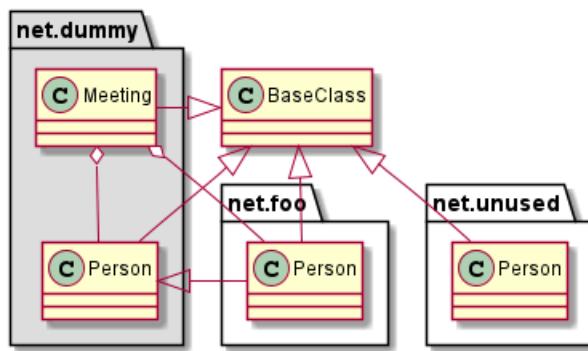
namespace net.foo {
    net.dummy.Person <|- Person
    .BaseClass <|-- Person

    net.dummy.Meeting o-- Person
}

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

```



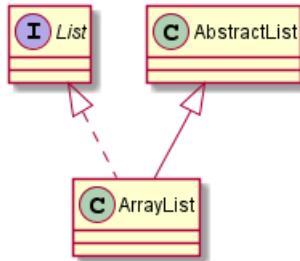


### 3.33 Extends and implements

It is also possible to use `extends` and `implements` keywords.

```

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



### 3.34 Bracketed relations (linking or arrow) style

#### 3.34.1 Line style

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

- without label

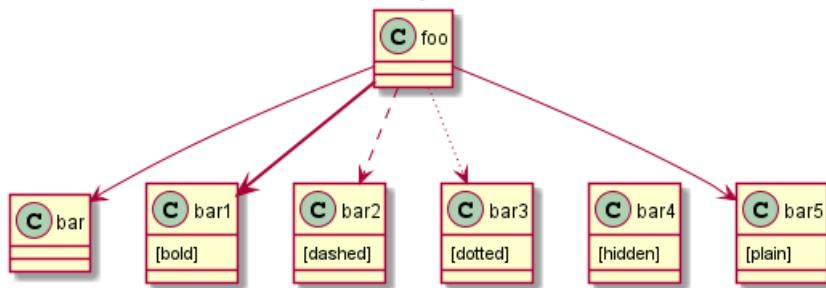
```

@startuml
title Bracketed line style without label
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
  
```



### Bracketed line style without label



- with label

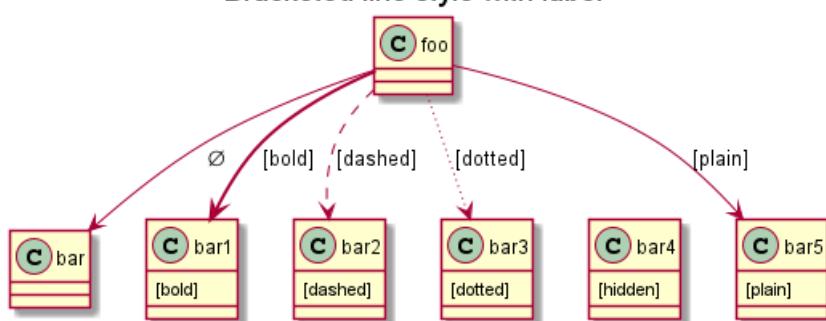
```

@startuml
title Bracketed line style with label
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
  
```

### Bracketed line style with label



[Adapted from QA-4181]

#### 3.34.2 Line color

```

@startuml
title Bracketed line color
class foo
class bar
bar1 : [#red]
bar2 : [#green]
bar3 : [#blue]

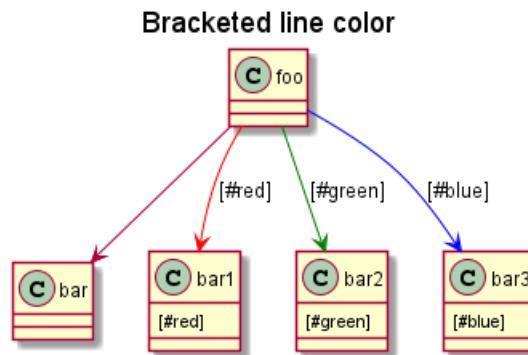
foo --> bar
foo -[#red]-> bar1 : [#red]
foo -[#green]-> bar2 : [#green]
  
```



```

foo -[#blue]-> bar3      : [#blue]
'foo -[#blue;#yellow;#green]-> bar4
@enduml

```



### 3.34.3 Line thickness

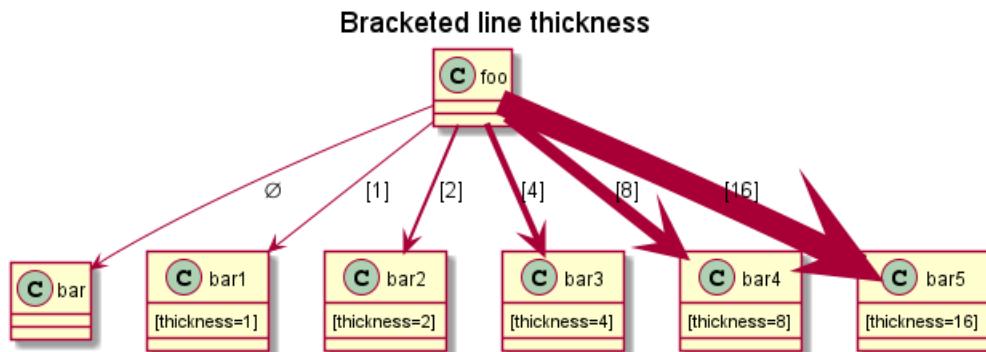
```

@startuml
title Bracketed line thickness
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]

### 3.34.4 Mix

```

@startuml
title Bracketed line style mix
class foo
class bar
bar1 : [#red,thickness=1]
bar2 : [#red,dashed,thickness=2]

```

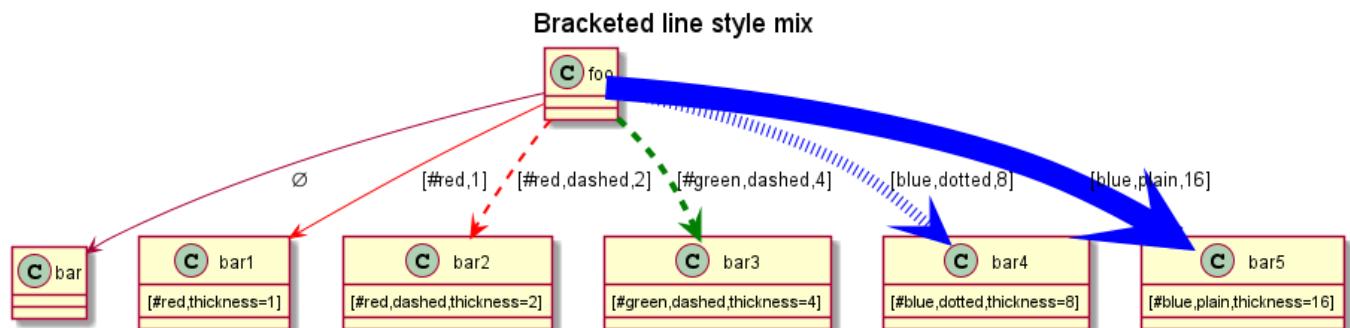


```

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

```



### 3.35 Change relation (linking or arrow) color and style (inline style)

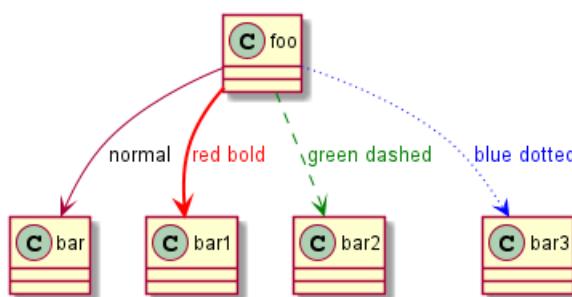
You can change the color or style of individual relation or arrows using the inline following notation:

- #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

```



[See similar feature on deployment]

### 3.36 Change class color and style (inline style)

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

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

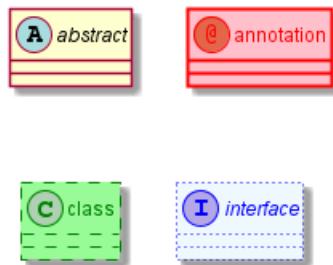
```

@startuml
abstract abstract
annotation annotation #pink;line:red;line.bold;text:red
class class #palegreen;line:green;line.dashed;text:green

```



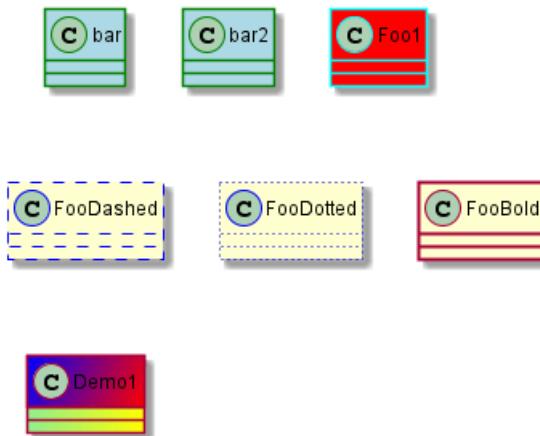
```
interface interface #aliceblue;line:blue;line.dotted;text:blue
@enduml
```



First original example:

```
@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]

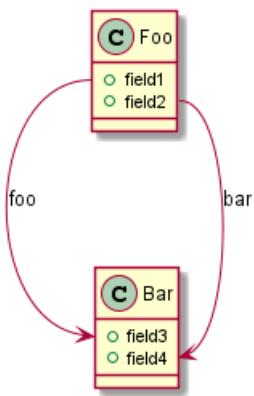
### 3.37 Arrows from/to class members

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

class Bar {
+ field3
+ field4
}

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





[Ref. QA-3636]

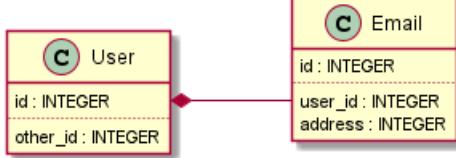
@startuml  
left to right direction

```

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]

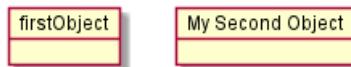


## 4 Диаграмма объектов

### 4.1 Определение объектов

Вы можете определить экземпляр объекта используя ключевое слово `object`.

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



### 4.2 Отношения между объектами

Отношения между объектами определяются с использованием следующий символов :

Type	Symbol	Image
Extension	< --	
Composition	*---	
Aggregation	o--	

Возможно заменить -- на .. чтобы получить линию из точек.

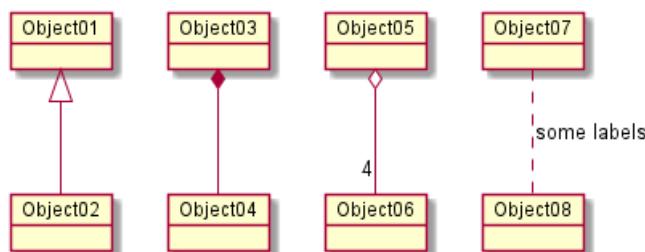
Зная данные правила, можно создать следующие картинки.

Возможно добавить описание к связи, используя :, с последующим текстом описания.

Для определения количества элементов, вы можете использовать двойные кавычки "" на каждой стороне связи.

```
@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 Associations objects

```
@startuml
object o1
object o2
```



```
diamond dia
object o3
```

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



#### 4.4 Добавление полей

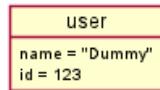
Для определения свойств (полей) объекта, задайте префикс `:`, указав вслед за ним имя свойства.

```
@startuml
```

```
object user
```

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

```
@enduml
```

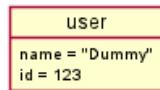


Также возможно разместить все поля между скобками `{}`.

```
@startuml
```

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

```
@enduml
```



#### 4.5 Общие с диаграммами классов функции

- Видимость
- Задание меток
- Использование пакетов
- Стилизование вывода



## 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 **Country => CapitalCity**" as CC {
    UK => London
    USA => Washington
    Germany => Berlin
}
@enduml
```

Map Country => 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
```



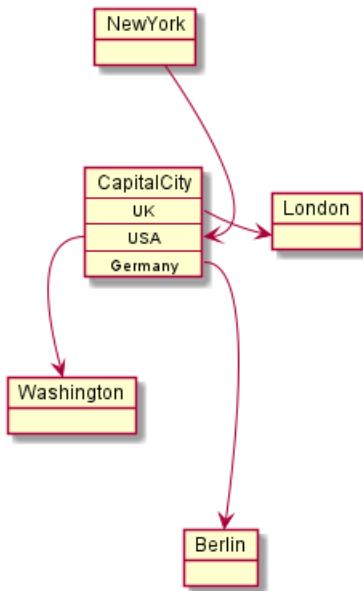
```
@startuml
object London
```



```
object Washington
object Berlin
object NewYork

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

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



[Ref. #307]



## 5 Диаграмма деятельности

### 5.1 Простая деятельность

Вы можете использовать (\*) для начальных и конечных точек диаграммы деятельности.

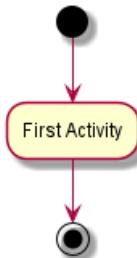
В некоторых случаях, вы можете использовать (\*top) чтобы указать что начальная точка должна быть в верху диаграммы.

Используйте --> для стрелок.

```
@startuml
```

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

```
@enduml
```



### 5.2 Метка на стрелках

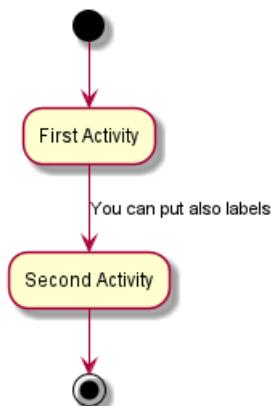
По умолчанию, стрелка начинается с последней использованной активности.

Вы можете пометить стрелку при помощи скобок [ и ] сразу после определения стрелки.

```
@startuml
```

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

```
@enduml
```



### 5.3 Изменение направления стрелки

Вы можете использовать -> для горизонтальных стрелок. Возможно задать направление стрелки используя следующий синтаксис:

- -down-> (default arrow)

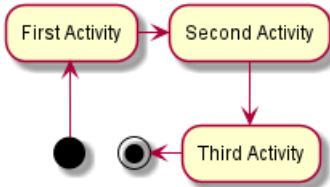


- -right-> or ->
- -left->
- -up->

@startuml

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

@enduml



## 5.4 Ветвления

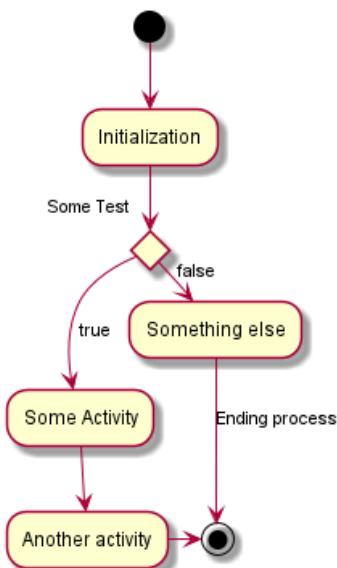
Вы можете использовать ключевые слова if/then/else чтобы определять ветви.

@startuml

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

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

@enduml



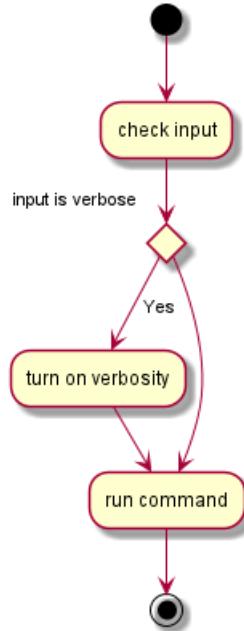
К сожалению, вам иногда придётся повторять ту же активность в тексте диаграммы:



```

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

```



## 5.5 Больше о ветках

По умолчанию, ветка соединена к последней заданной активности, но возможно переопределить это и задать связь с помощью ключевого слова `if`.

Также возможно создавать вложенные ветки.

```

@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"

```



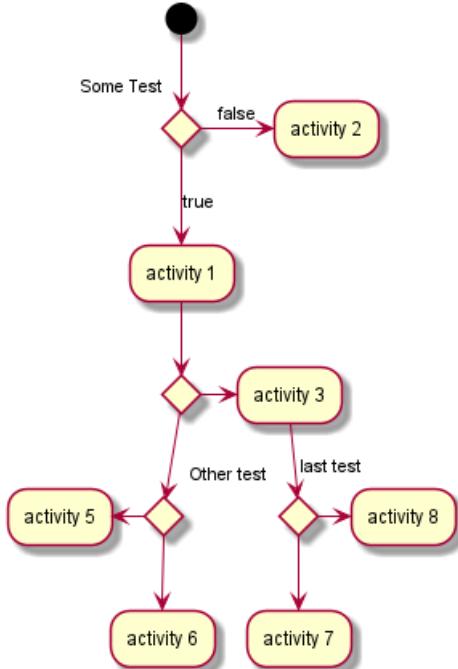
```

endif

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

@enduml

```



## 5.6 Синхронизация

Вы можете использовать === code ===, чтобы отобразить барьеры синхронизации.

```

@startuml

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

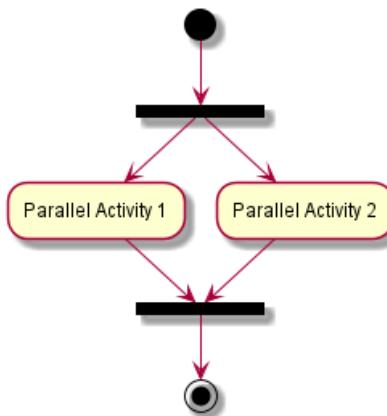
====B1==== --> "Parallel Activity 2"
--> ===B2===

--> (*)

@enduml

```





## 5.7 Длинное описание активности

Когда вы задаёте активность, вы можете разделить её описание на несколько линий. Вы также можете добавить в описание.

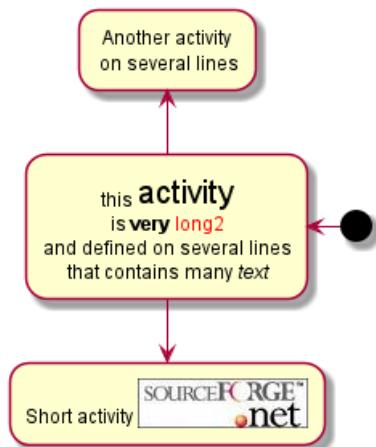
Вы также можете задать короткий код активности с помощью ключевого слова as. Этот код может быть использован позже в описании диаграммы.

```

@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 Заметки

Вы можете добавить заметки к активности используя команды note left, note right, note top or note bottom, сразу после описания активности, к которой вы хотите прикрепить заметку.

Если вы хотите прикрепить заметку к точке начала, задайте метку в самом начале описания диаграммы.

Вы также можете создать заметку на нескольких линиях, используя ключевое слово endnote.

```
@startuml
```

```
(*) --> "Some Activity"
```

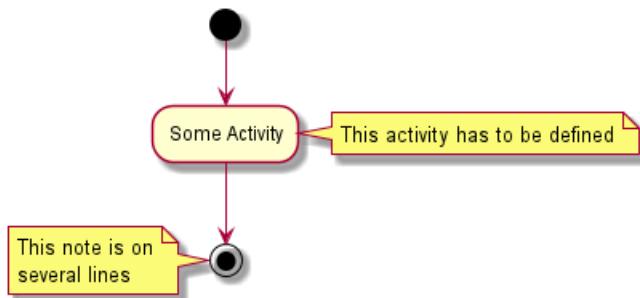


```

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

@enduml

```



## 5.9 Разделы

Вы можете задать раздел используя ключевое слово `partition`, и опционально задать цвет фона для своего раздела (Используя код цвета html или название цвета)

Когда вы задаёте активность, они автоматически попадают в последнюю заданную активность.

Вы можете закрыть раздел используя закрывающую скобку }.

```
@startuml
```

```

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

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

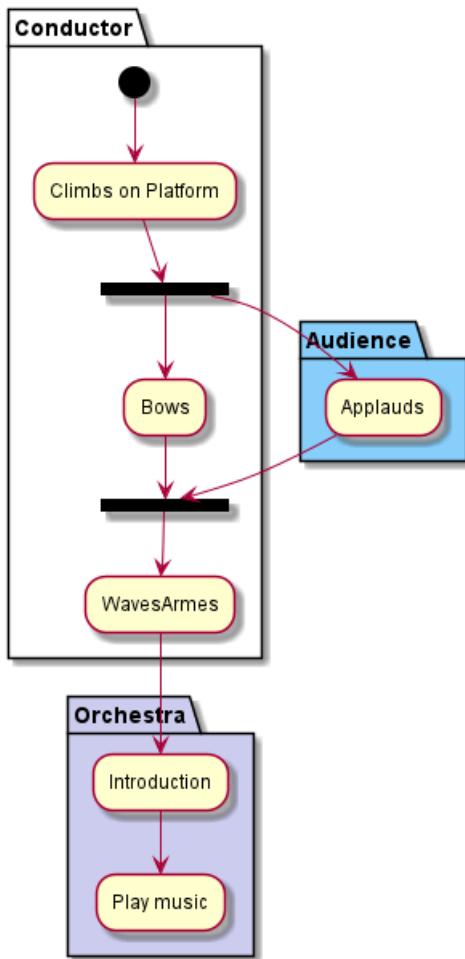
partition Conductor {
    Bows --> === S2 ===
    --> WavesArmes
    Applauds --> === S2 ===
}

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

```

```
@enduml
```





## 5.10 Skinparam

Вы можете использовать команду `skinparam` чтобы изменить цвет и шрифт рисования.

Вы можете использовать команду :

- В определении диаграммы, как любую другую команду,
- В подключаемом файле,
- В конфигурационном файле, подставленный в командной строке ANT задания.

Вы можете задать определённый цвет и шрифт для активностей с шаблоном.

`@startuml`

```

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

```

```

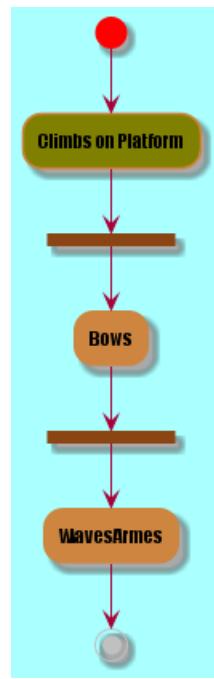
(*) --> "Climbs on Platform" << Begin >>
--> === S1 ===
--> Bows

```



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

@enduml



## 5.11 Восьмиугольник

Вы можете изменить форму активностей на восьмиугольник, используя команду `skinparam activityShape octagon`.

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

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

@enduml



## 5.12 Полноценный пример

```
@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

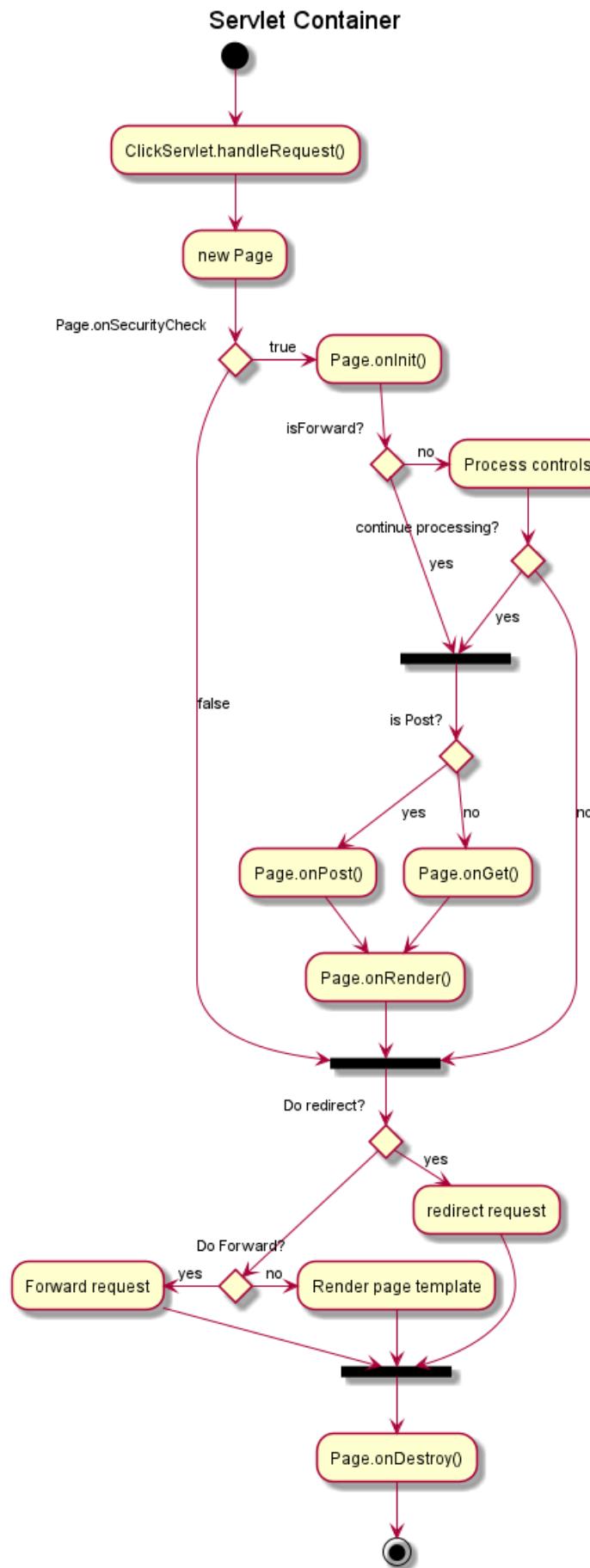
else
-->[false] ===REDIRECT_CHECK===
endif

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





## 6 Диаграмма активности (бета)

Текущий синтаксис диаграммы активности имеет несколько ограничений и недостатков (например, её сложно поддерживать).

Таким образом, новый синтаксис и реализация предложены как **бета версия** пользователям (начиная с V7947), так что мы сможем определить новый формат и синтаксис.

Другое преимущество этой новой реализации, это то, что для неё не будет требоваться установленный Graphviz (как для диаграмм последовательностей).

Новый синтаксис заменит старый. Однако, по причине совместимости, старый синтаксис всё ещё будет распознаваться, чтобы обеспечивать *восходящую совместимость*.

Пользователи будут просто поощряться при миграции на новый синтаксис.

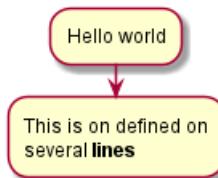
### 6.1 Простая активность

Описания активностей начинаются с : и заканчиваются ;.

Форматировать текст возможно, используя синтаксис creole.

Активности косвенно связаны в порядке их определения.

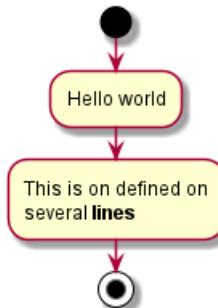
```
@startuml
:Hello world;
:This is on defined on
several **lines**;
@enduml
```



### 6.2 Старт/Стоп

Вы можете использовать ключевые слова `start` и `stop`, чтобы обозначать начало и конец диаграммы.

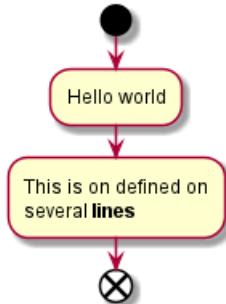
```
@startuml
start
:Hello world;
:This is on defined on
several **lines**;
stop
@enduml
```



Вы также можете использовать ключевое слово `end`.



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

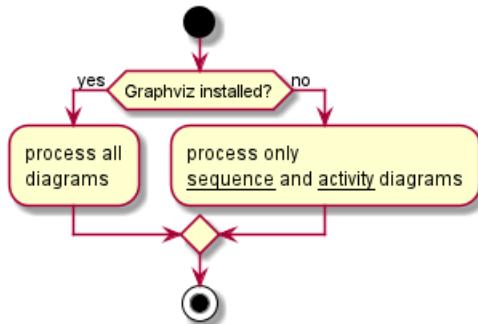


### 6.3 Условия

Вы можете использовать ключевые слова `if`, `then` и `else`, чтобы добавить проверяющие условия на вашу диаграмму. Описания можно добавить, используя круглые скобки.

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

stop
@enduml
```



#### 6.3.1 Ряд проверок (горизонтальное отображение)

Вы можете использовать ключевое слово `elseif`, чтобы создать несколько проверок (*по умолчанию используется режим горизонтального отображения*):

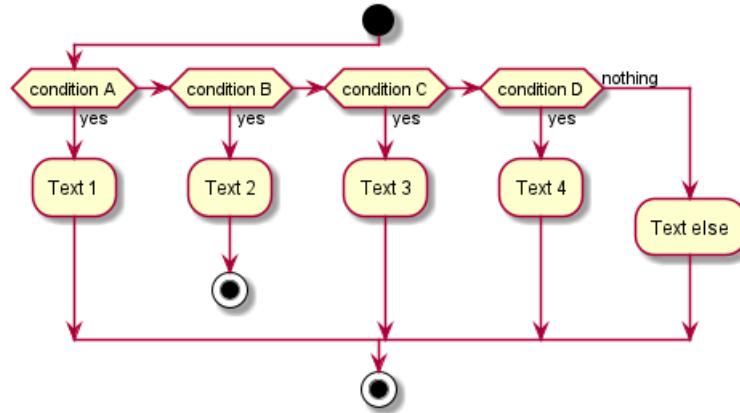
```
@startuml
start
if (condition A) then (yes)
    :Text 1;
```



```

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

```



### 6.3.2 Ряд проверок (вертикальное отображение)

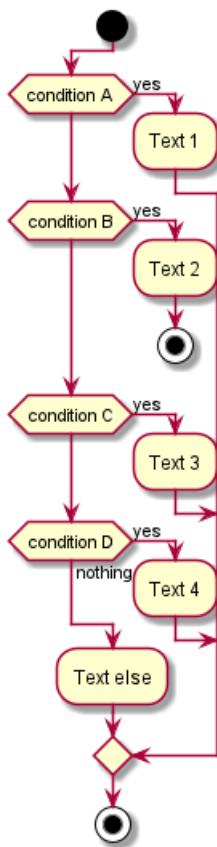
Используйте команду `!pragma useVerticalIf on` для отображения проверок в вертикальном режиме:

```

@startuml
!pragma useVerticalIf on
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

```





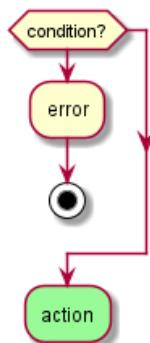
[Ref. QA-3931]

## 6.4 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 an precise action, you can use the kill or detach keyword:

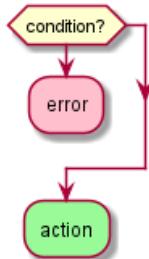
- kill

```

@startuml
if (condition?) then
  
```



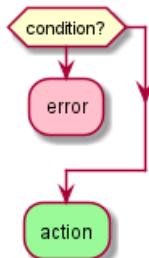
```
#pink:error;
kill
endif
#palegreen:action;
@enduml
```



[Ref. QA-265]

- detach

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



## 6.5 Повторяющийся цикл

Используйте ключевые слова `repeat` и `repeatwhile` для создания повторяющихся циклов.

```
@startuml

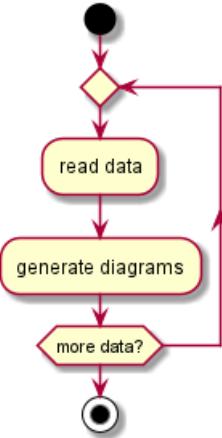
start

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

stop

@enduml
```





Для включения в обратный путь цикла самостоятельного действия используйте ключевое слово `backward`.

`@startuml`

`start`

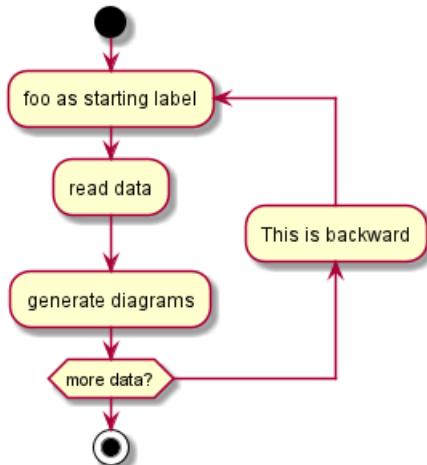
```

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

```

`stop`

`@enduml`



## 6.6 Break on a repeat loop [break]

You can break after an action on a loop.

```

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

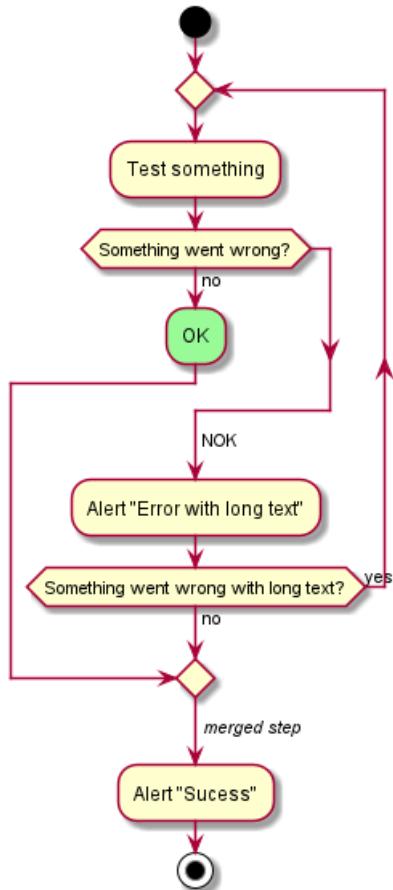
```



```

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

```



[Ref. QA-6105]

## 6.7 Цикл while

Используйте ключевые слова `while` и `end while` для создания повторяющихся циклов.

@startuml

```

start

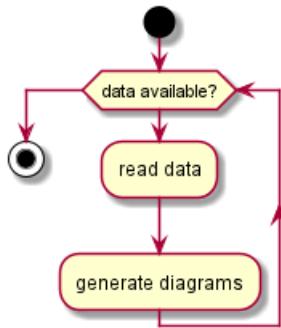
while (data available?)
    :read data;
    :generate diagrams;
endwhile

stop

@enduml

```

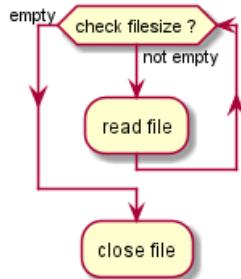




Добавить описание можно после ключевого слова `endwhile` или используя ключевое слово `is`.

```

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



## 6.8 Паралельная обработка

Используйте ключевые слова `fork`, `fork again` и `end fork` для определения параллельных процессов.

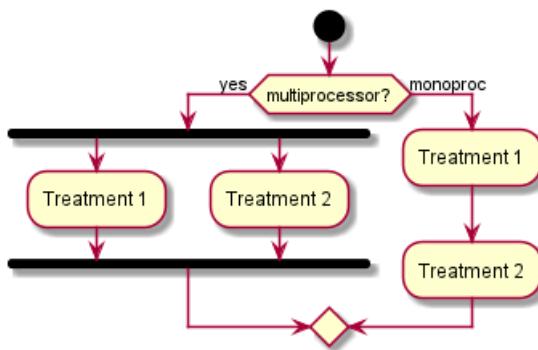
```

@startuml
start

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

@enduml
  
```





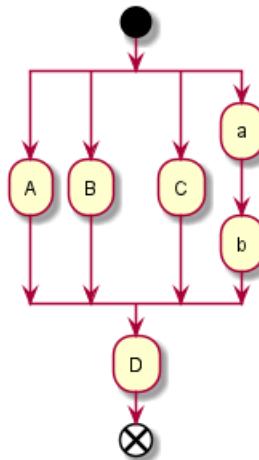
## 6.9 Split processing

### 6.9.1 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
  
```



### 6.9.2 Input split (multi-start)

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

```

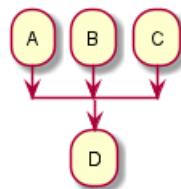
@startuml
split
  -[hidden]->
  :A;
split again
  
```



```

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

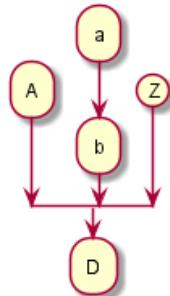
```



```

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

```



[Ref. QA-8662]

### 6.9.3 Output split (multi-end)

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

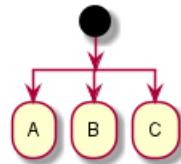
```

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

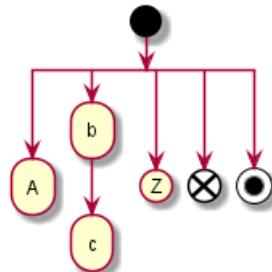
```



```
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
```



## 6.10 Заметки

Форматирование текста может быть сделано с использованием синтаксиса creole.

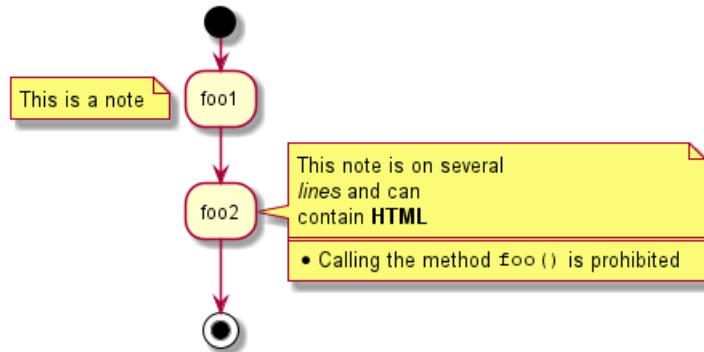
Заметку можно сделать отсоединенной с помощью ключевого слова `floating`.

```
@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
```

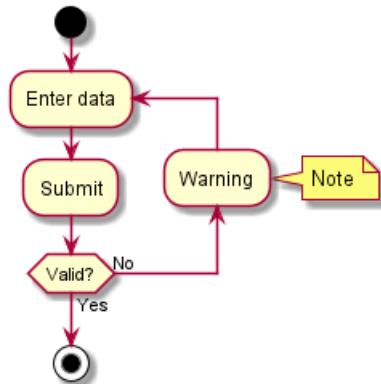


Заметка также может быть добавлена к действию, входящему в обратный поток цикла.

```
@startuml
```

```

start
repeat :Enter data;
:Submit;
backward :Warning;
note right: Note
repeat while (Valid?) is (No) not (Yes)
stop
@enduml
  
```



[Ref. QA-II788]

## 6.11 Цвета

Вы можете задать цвет некоторым активностям.

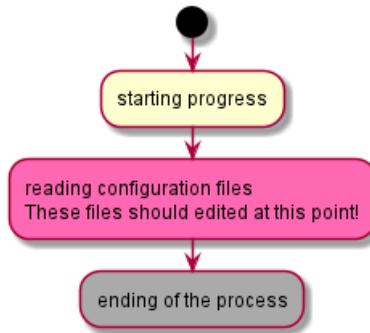
```
@startuml
```

```

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

```
@enduml
```



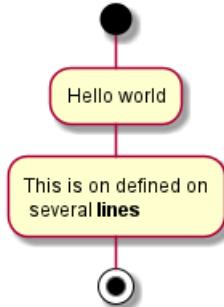


## 6.12 Линии без стрелок

Используйте команду `skinparam ArrowHeadColor none` для соединения действий линиями без стрелок.

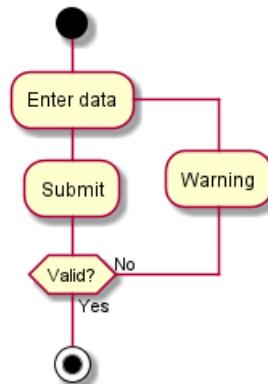
```

@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
  
```

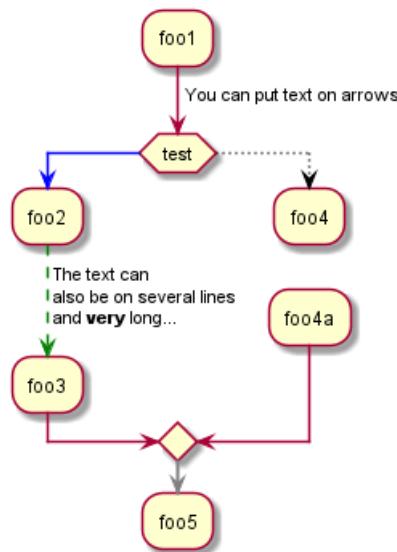


## 6.13 Стрелки

Используя нотацию `->`, вы можете добавить текст к стрелке, аи поменять их цвет.

Так же можно сделать стрелки: из точек (dotted), из дефисов (dashed), жирные (bold) и скрытые (hidden).

```
@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;
-[hidden]->
:foo4a;
endif
-[#gray,bold]->
:foo5;
@enduml
```

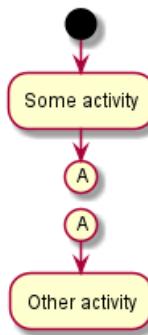


## 6.14 Connector

You can use parentheses to denote connector.

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



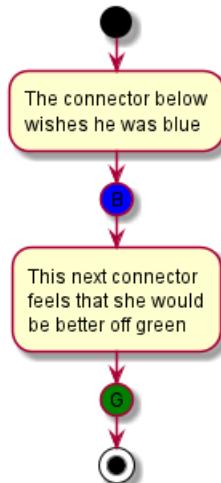


## 6.15 Color on connector

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;
#ggreen:(G)
stop
@enduml
  
```



[Ref. QA-10077]

## 6.16 Группирование

Вы можете группировать активности вместе, определяя раздел:

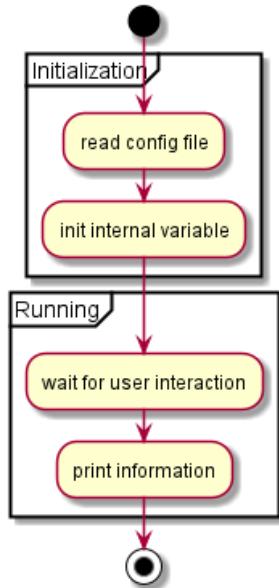
```

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



```
}
```

```
stop
@enduml
```



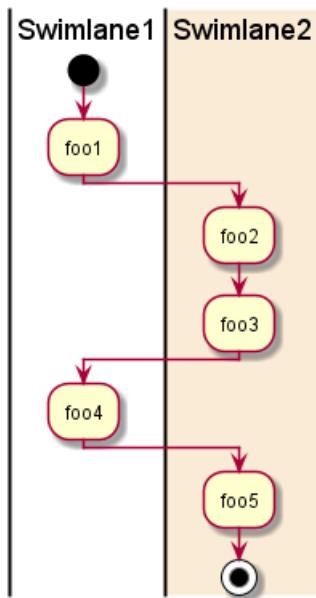
## 6.17 Дорожки

Используя символ |, вы можете определять плавающие линии.

Также возможно изменять цвет плавающих линий.

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



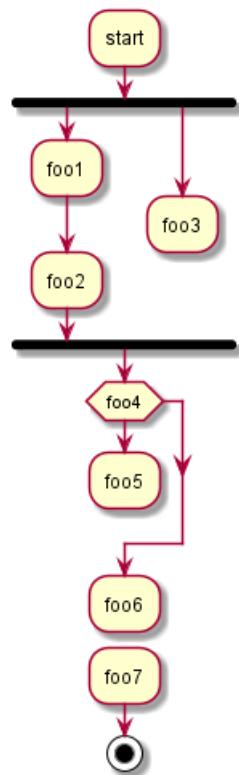


## 6.18 Отсоединение

Возможно убрать стрелку используя ключевое слово detach.

```
@startuml
:start;
fork
:foo1;
:foo2;
fork again
:foo3;
detach
endfork
if (foo4) then
:foo5;
detach
endif
:foo6;
detach
:foo7;
stop
@enduml
```





## 6.19 SDL

Изменяя последний разделитель ;, вы можете установить различный рендеринг для активности:

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

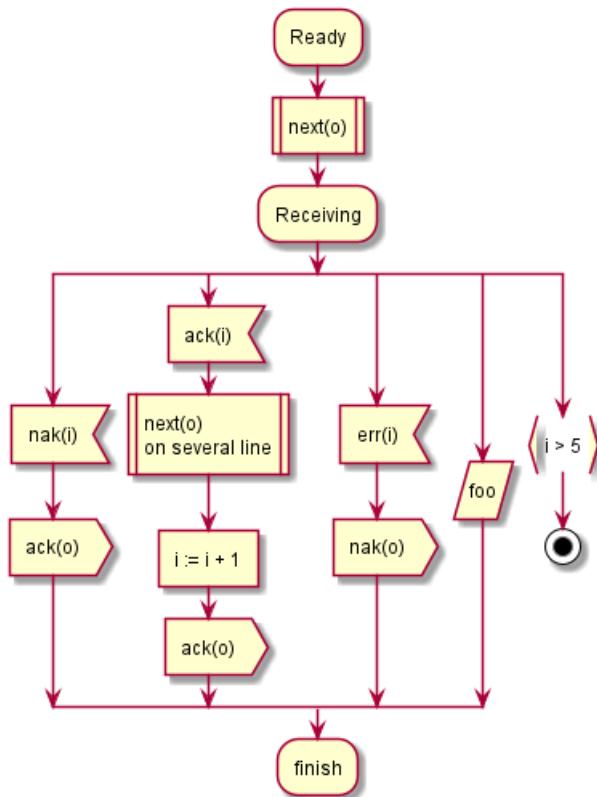
```

@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
```



## 6.20 Полноценный пример

```
@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)
```



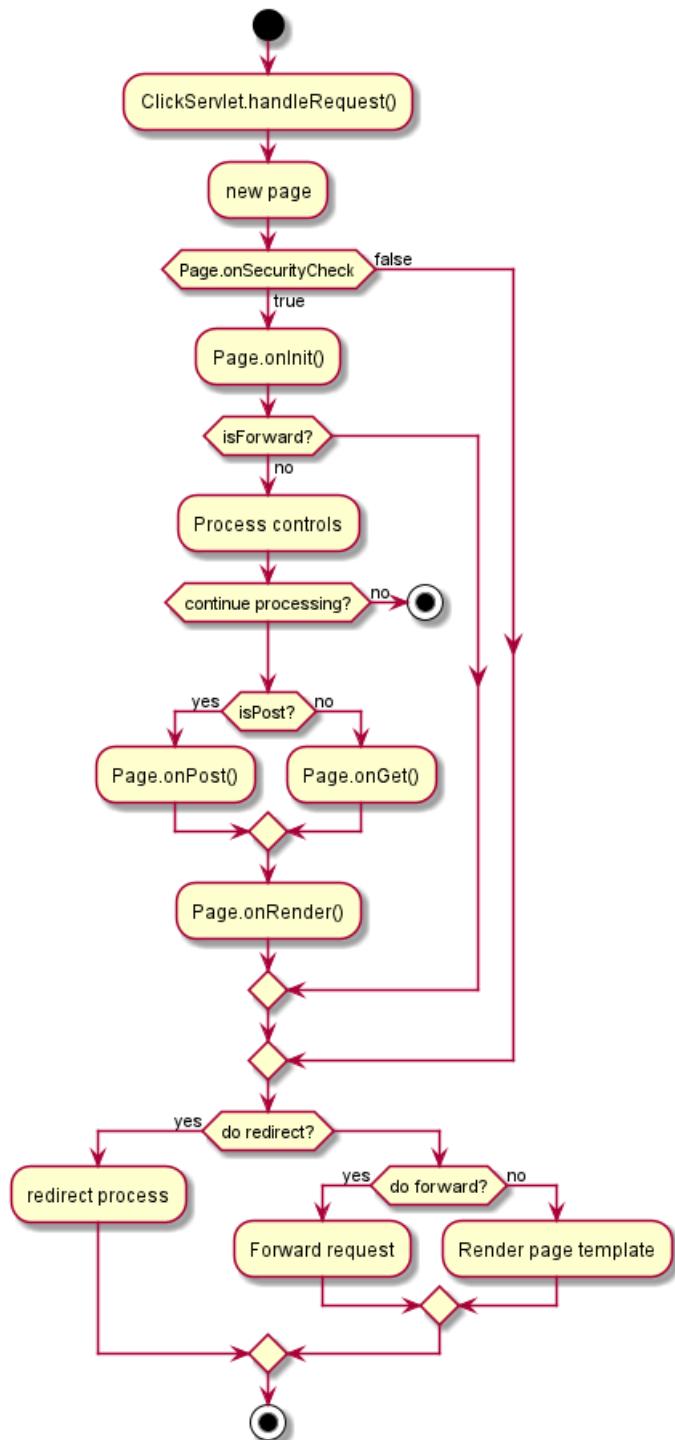
```

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

stop

@enduml

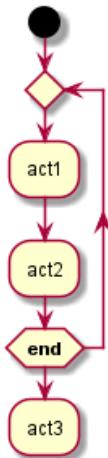
```



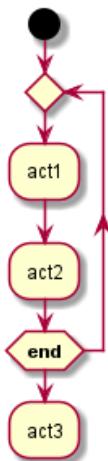
## 6.21 Condition Style

### 6.21.1 Inside style (by default)

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



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



### 6.21.2 Diamond style

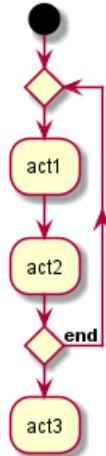
```
@startuml
skinparam conditionStyle diamond
start
```



```

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

```

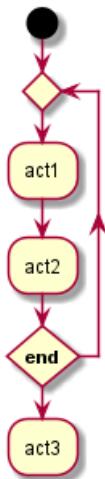


### 6.21.3 InsideDiamond (or *foo1*) style

```

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

```



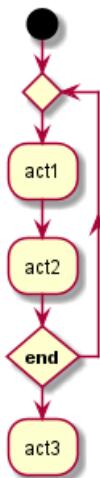
```

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

```



@enduml



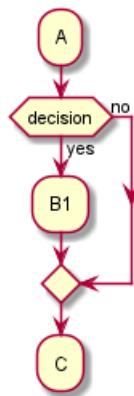
[Ref. QA-1290 and #400]

## 6.22 Condition End Style

### 6.22.1 Diamond style (by default)

- With one branch

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

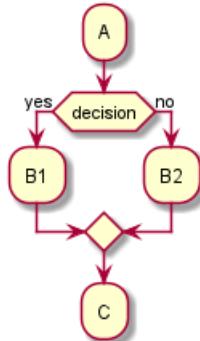


- With two branches (B1, B2)

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



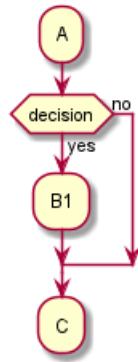
```
:C;
@enduml
@enduml
```



### 6.22.2 Horizontal line (hline) style

- With one branch

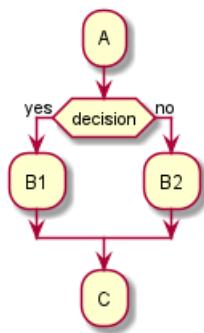
```
@startuml
skinparam ConditionEndStyle hline
:A;
if (decision) then (yes)
  :B1;
else (no)
endif
:C;
@enduml
```



- 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]



## 7 Диаграмма компонентов

Let's have few examples : Let's have few examples.

### 7.1 Компоненты

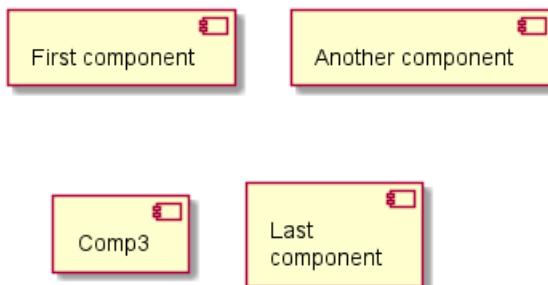
Обозначения компонентов должны быть заключены в квадратные скобки.

Также можно использовать ключевое слово `component` для объявления компонента. Вы можете объявить алиас с помощью ключевого слова `as`. Этот алиас может быть использован позже, при объявлении связей.

```
@startuml
```

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

```
@enduml
```



### 7.2 Интерфейсы

Для обозначения интерфейса используется символ () (потому что он выглядит как круг).

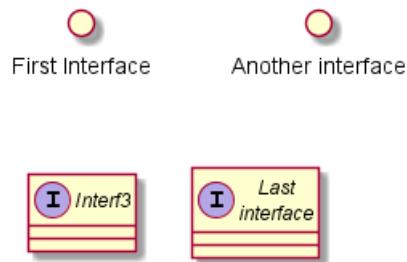
Также возможно использование ключевого слова `interface` для объявления интерфейса. Вы можете объявить алиас с помощью ключевого слова `as`. Этот алиас может быть использован позднее, когда будут задаваться связи.

Далее мы увидим, что задание интерфейсов опционально.

```
@startuml
```

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

```
@enduml
```



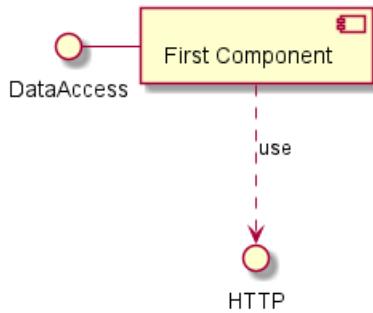
### 7.3 Простой пример

Отношения между элементами создаются с помощью комбинации точечных линий (..), прямых линий (--) и стрелок (-->).

```
@startuml
```

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

```
@enduml
```



### 7.4 Использование заметок

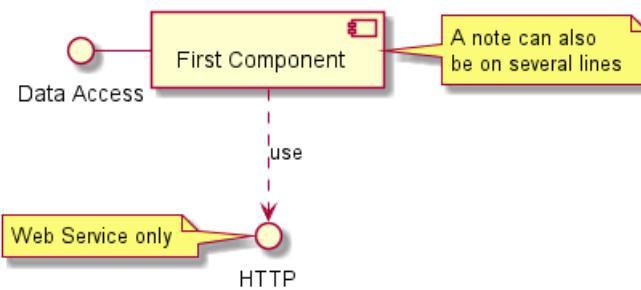
Вы можете использовать ключевые слова `note left of`, `note right of`, `note top of`, `note bottom of` чтобы задать метки, относящиеся к одному объекту.

Заметка также может быть задана не прикреплённой, используя ключевое слово `note`, а затем прикреплена к другим объектам, используя символ ...

```
@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 Группирование компонентов

Вы можете использовать несколько ключевых слов `package`, чтобы группировать компоненты и интерфейсы вместе.



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

```
@startuml

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

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

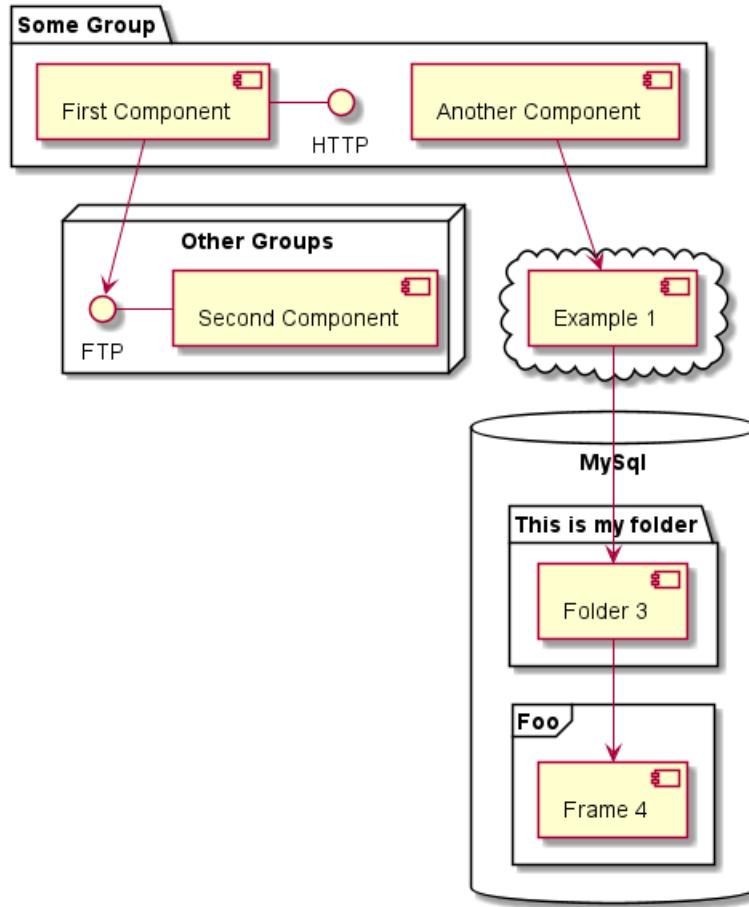
cloud {
    [Example 1]
}

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
```

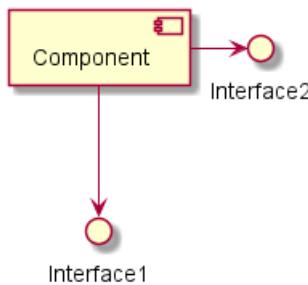




## 7.6 Изменение направления стрелок

По умолчанию, связи между классами имеют два тире -- и ориентированы вертикально. Можно создавать горизонтальные связи с помощью одного тире (или точки), вот так:

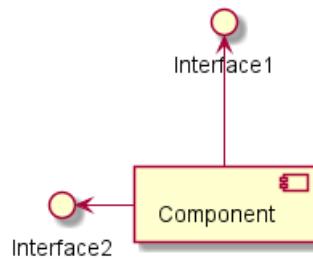
```
@startuml
[Component] --> Interface1
[Component] -> Interface2
@enduml
```



Вы также можете изменять направления, перевернув связь:

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

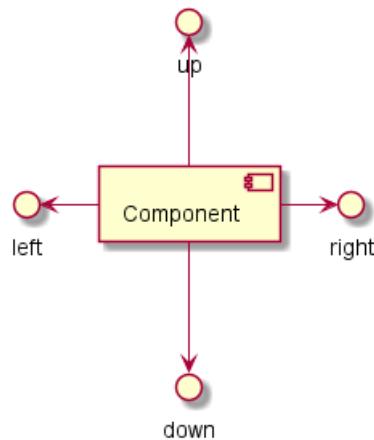




Также, можно изменить направление стрелки добавлением ключевых слов `left`, `right`, `up` или `down` внутри стрелки:

```

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



Вы можете сократить запись, используя только первую букву направления (например, `-d-` вместо `-down-`) или две первые буквы (`-do-`).

Пожалуйста, заметьте, что не стоит использовать эту функциональность без особой надобности: *Graphviz* обычно даёт хорошие результаты без дополнительной настройки.

## 7.7 Use UML2 notation

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

```
@startuml
```

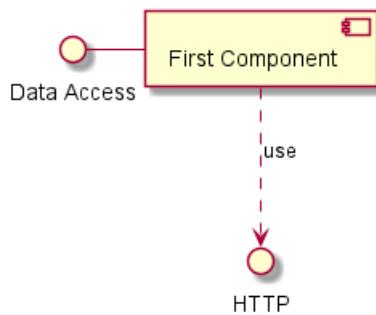
```

interface "Data Access" as DA

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

@enduml
  
```





## 7.8 Использование нотации UML1

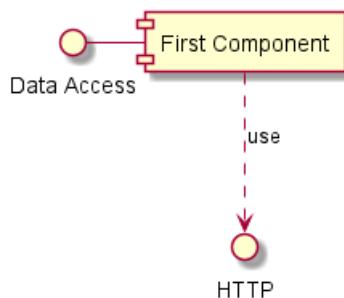
Команда `skinparam componentStyle uml1` используется, чтобы переключиться на нотацию UML1.

```
@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)

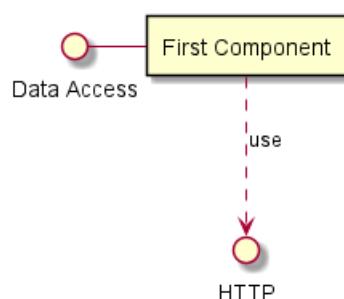
Команда `skinparam componentStyle rectangle` используется для переключения на нотацию в виде прямоугольников (без никакой UML нотации).

```
@startuml
skinparam componentStyle rectangle
```

```
interface "Data Access" as DA
```

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

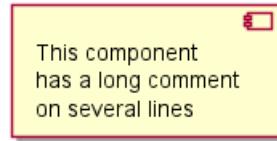
```
@enduml
```



## 7.10 Длинное описание

Для помещения многострочного текста в тело компонента используются квадратные скобки

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



## 7.11 Индивидуальные цвета

Вы можете задать цвет после определения компонента.

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

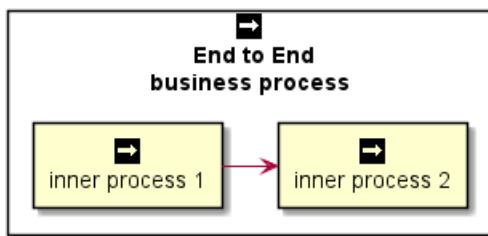


## 7.12 Использование Sprite в стереотипах

Можно использовать спрайты внутри компонентов стереотипа.

```
@startuml
sprite $businessProcess [16x16/16] {
FFFFFFFFFFFFFFFFFF
FFFFFFFFFFFFFFFFFF
FFFFFFFFFFFFFFFFFF
FFFFFFFFFFFFFFFFFF
FFFFFFFFFFFFFOFFFFF
FFFFFFFFFFFFFO0FFFF
FF000000000000FF
FF000000000000FF
FF000000000000FF
FFFFFFFFFFFFFOFFFFF
FFFFFFFFFFFFFOFFFFF
FFFFFFFFFFFFFFFFFF
FFFFFFFFFFFFFFFFFF
FFFFFFFFFFFFFFFFFF
}
rectangle " End to End\nbusiness process" <<$businessProcess>> {
rectangle "inner process 1" <<$businessProcess>> as src
rectangle "inner process 2" <<$businessProcess>> as tgt
src -> tgt
}
@enduml
```





## 7.13 Skinparam

Вы можете использовать команду `skinparam` для изменения шрифтов и цветов диаграммы

Вы можете использовать данную команду :

- В определении диаграммы, как любую другую команду,
- В подключенному файле,
- В конфигурационном файле, указанном в командной строке в задании ANT.

Вы можете задать цвет и шрифт для компонентов и интерфейсов с заданными шаблонами.

`@startuml`

```

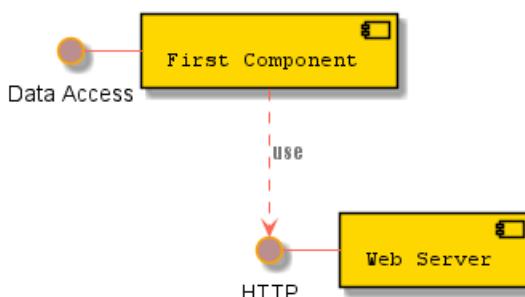
skinparam interface {
    backgroundColor RosyBrown
    borderColor orange
}

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

() "Data Access" as DA

DA - [First Component]
[First Component] ..> () HTTP : use
HTTP - [Web Server] << Apache >>
  
```

`@enduml`



`@startuml`



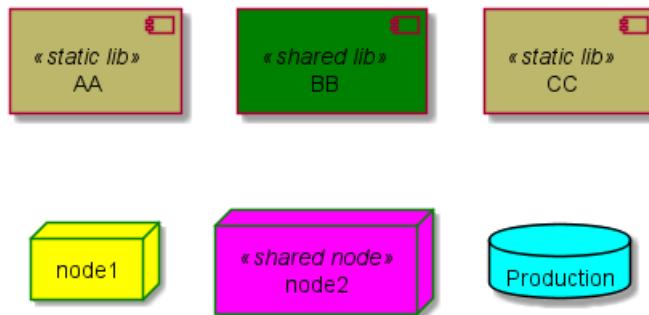
```
[AA] <<static lib>>
[BB] <<shared lib>>
[CC] <<static lib>>

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
```



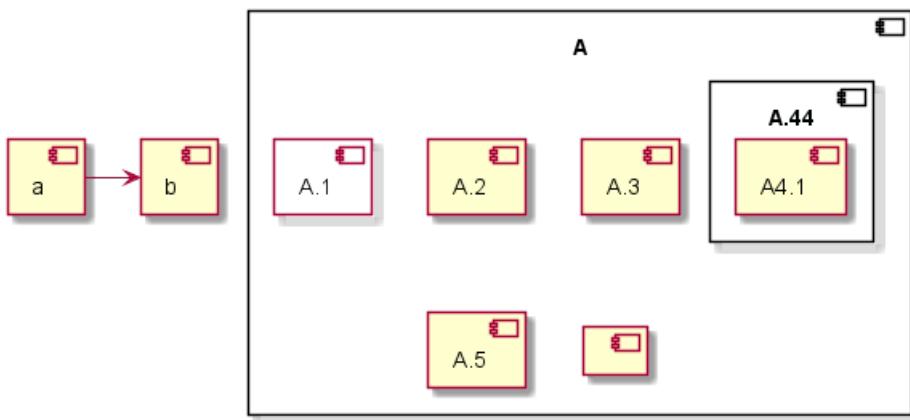
## 7.14 Specific SkinParameter

### 7.14.1 componentStyle

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

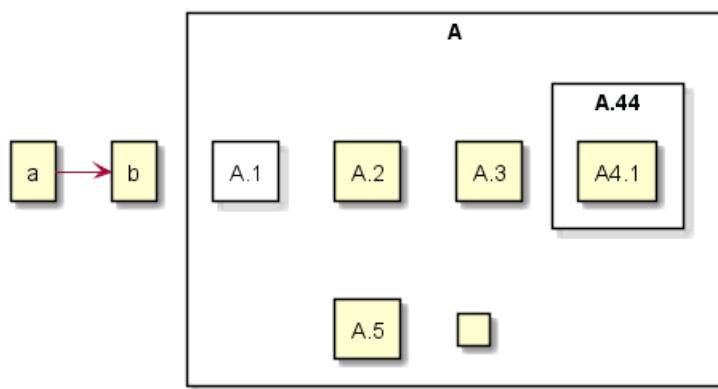
```
@startuml
skinparam BackgroundColor transparent
skinparam componentStyle uml2
component A {
    component "A.1" {
    }
    component A.44 {
        [A4.1]
    }
    component "A.2"
    [A.3]
    component A.5 [
A.5]
    component A.6 [
    ]
}
[a]->[b]
@enduml
```





- 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]

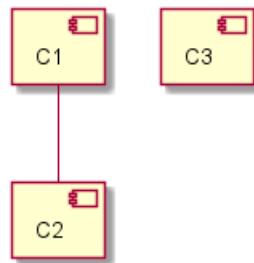
## 7.15 Hide or Remove unlinked component

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
```

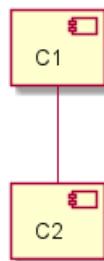
```
hide @unlinked
@enduml
```



- or remove @unlinked components:

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

```
remove @unlinked
@enduml
```



[Ref. QA-11052]

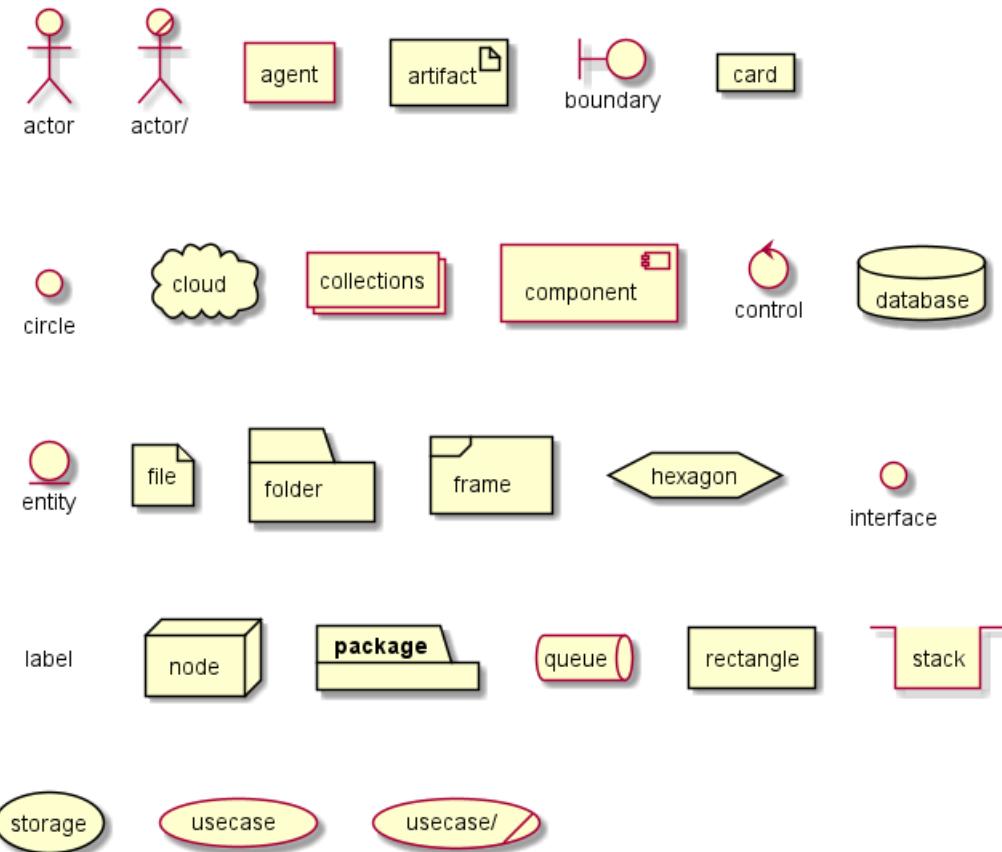


## 8 Deployment Diagram

### 8.1 Declaring element

```
@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  
queue queue  
rectangle rectangle  
stack stack  
storage storage  
usecase usecase  
usecase/ "usecase/"  
@enduml
```





You can optionally put text using bracket [] for a long description.

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

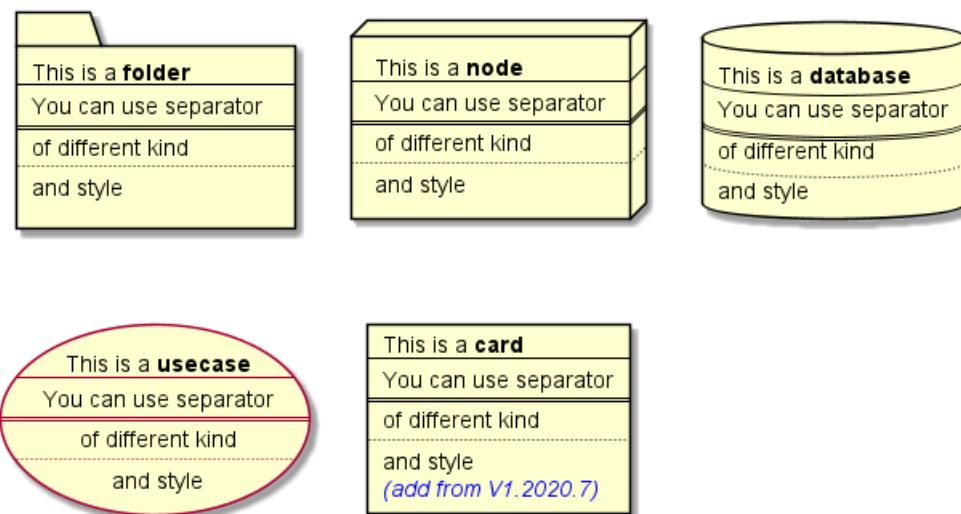
node node [
This is a <b>node
-----
You can use separator
=====
of different kind
....
and style
]

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

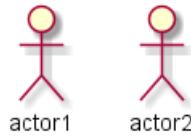
### 8.2.1 Actor

```
@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
```

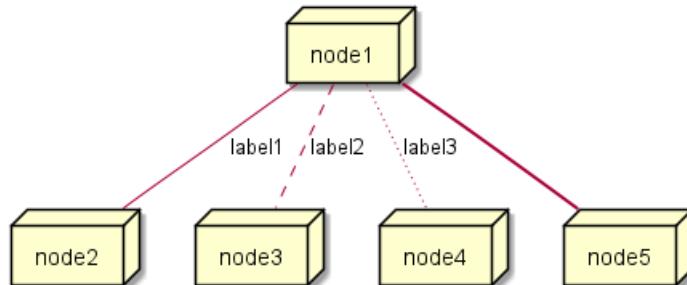


```

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:

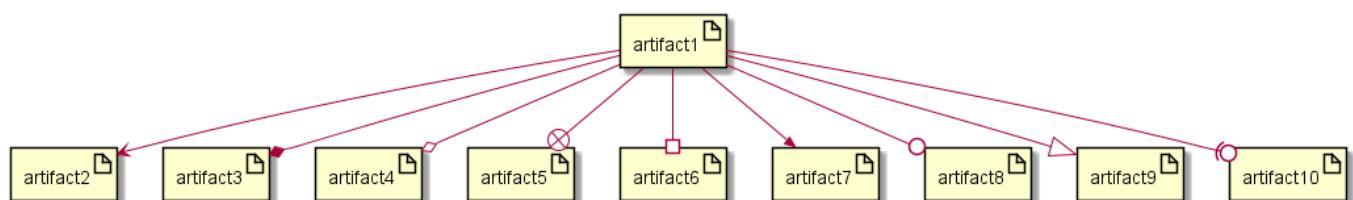
@startuml

```

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

```

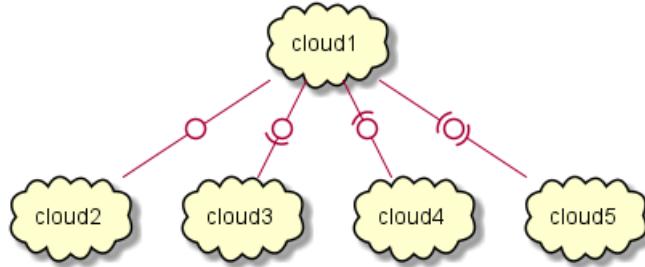


```

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

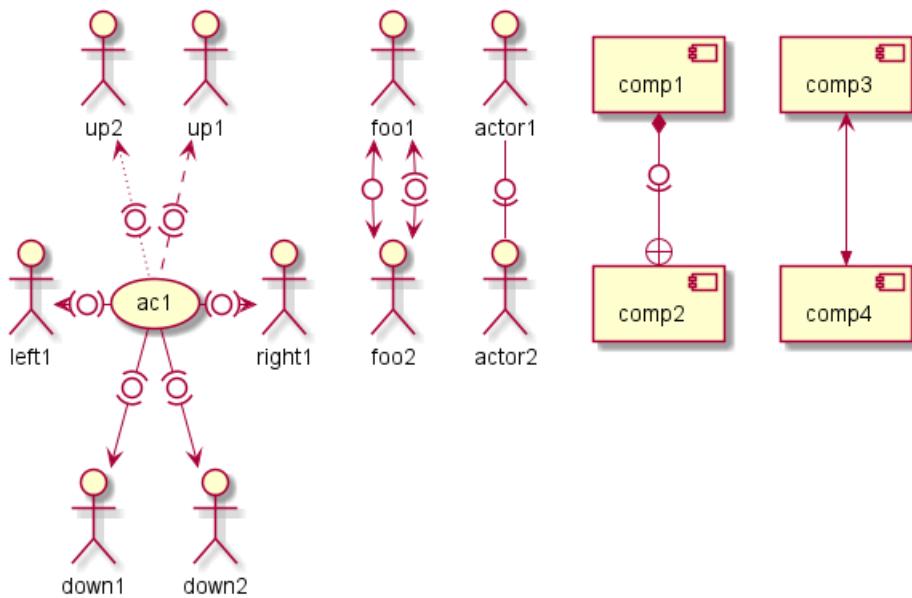
```

```

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

```





[Ref. QA-1736]

□ See all type on **Appendix**.

## 8.4 Bracketed arrow style

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

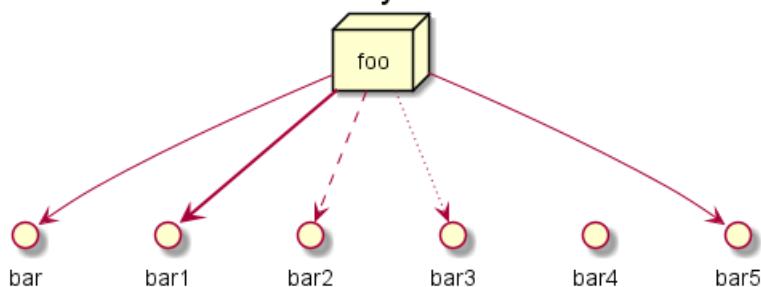
### 8.4.1 Line style

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
```

Bracketed line style without label



- with label

```
@startuml
title Bracketed line style with label
node foo
```

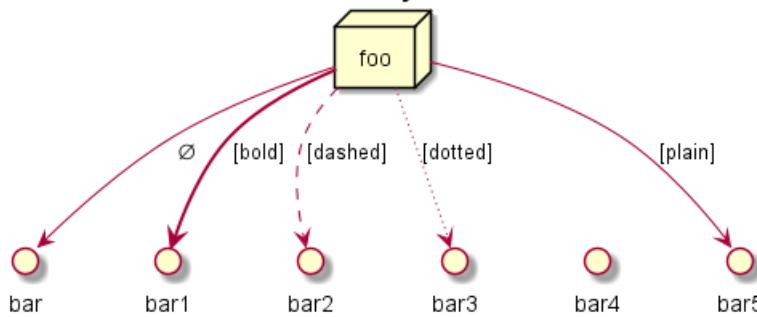


```

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

```

### Bracketed line style with label



[Adapted from QA-4181]

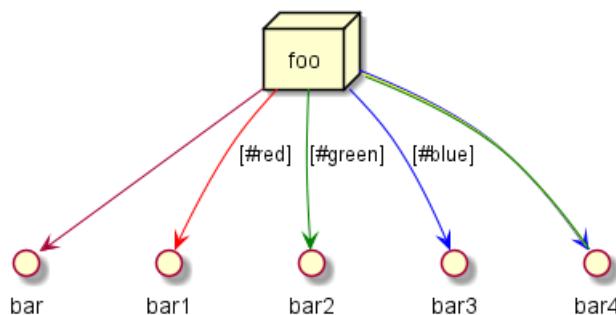
#### 8.4.2 Line color

```

@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

```

### Bracketed line color



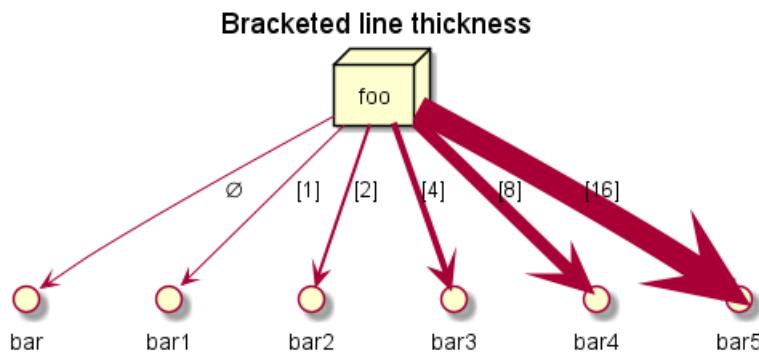
#### 8.4.3 Line thickness

```

@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

```

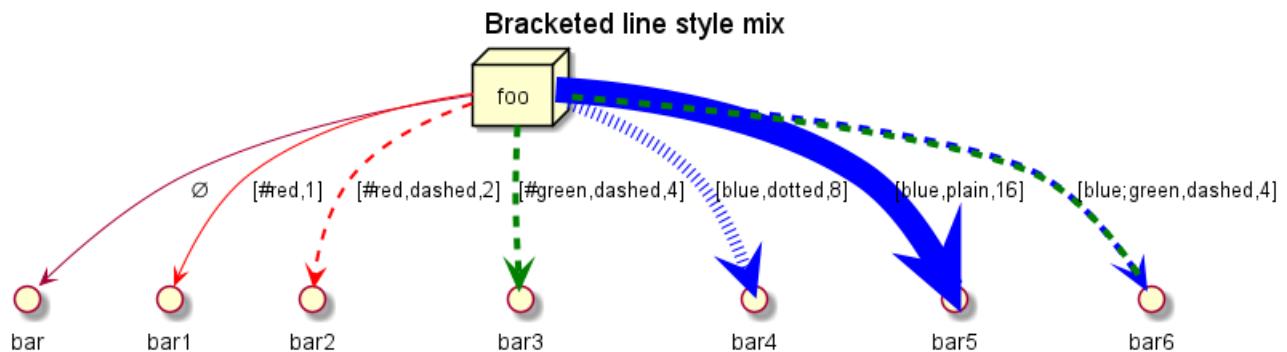




[Adapted from QA-4949]

#### 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
```



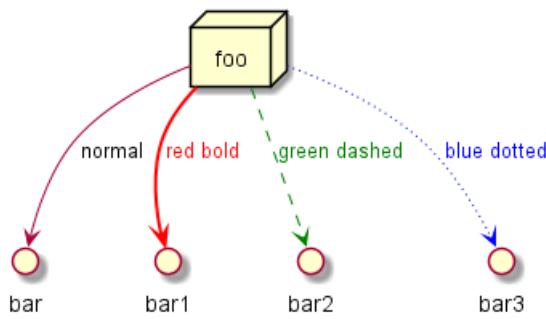
## 8.5 Change arrow color and style (inline style)

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)

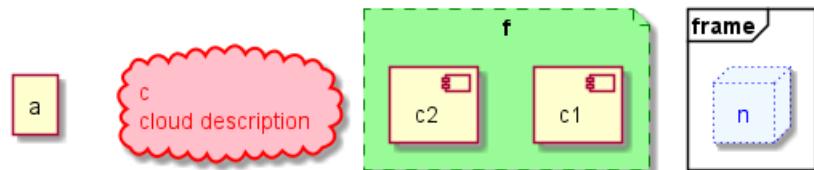
You can change the color or style of individual element using the following notation:

- # [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

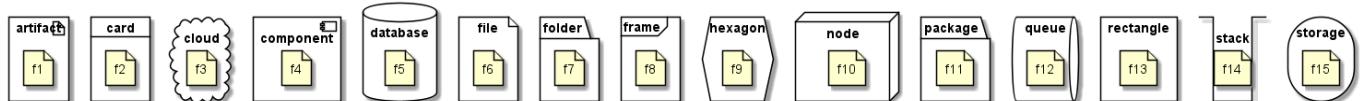
```
@startuml
artifact      artifactVeryL00000000000000000000g      as "artifact" {
file f1
}
card         cardVeryL00000000000000000000g      as "card" {
file f2
}
cloud        cloudVeryL00000000000000000000g      as "cloud" {
file f3
}
component    componentVeryL00000000000000000000g   as "component" {
file f4
}
database     databaseVeryL00000000000000000000g    as "database" {
file f5
}
```



```

}
file      fileVeryL0000000000000000000g      as "file" {
file f6
}
folder    folderVeryL0000000000000000000g     as "folder" {
file f7
}
frame     frameVeryL0000000000000000000g     as "frame" {
file f8
}
hexagon   hexagonVeryL0000000000000000000g    as "hexagon" {
file f9
}
node      nodeVeryL0000000000000000000g      as "node" {
file f10
}
package   packageVeryL0000000000000000000g    as "package" {
file f11
}
queue     queueVeryL0000000000000000000g     as "queue" {
file f12
}
rectangle rectangleVeryL0000000000000000000g  as "rectangle" {
file f13
}
stack     stackVeryL0000000000000000000g     as "stack" {
file f14
}
storage   storageVeryL0000000000000000000g    as "storage" {
file f15
}
@enduml

```



### 8.8.2 Other example

```

@startuml
artifact Foo1 {
    folder Foo2
}

folder Foo3 {
    artifact Foo4
}

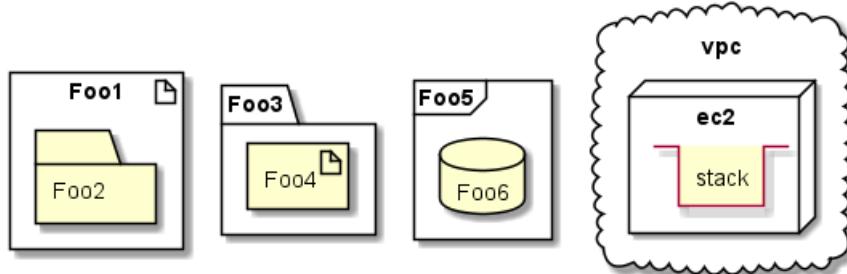
frame Foo5 {
    database Foo6
}

cloud vpc {
    node ec2 {
        stack stack
    }
}

```



```
@enduml
```

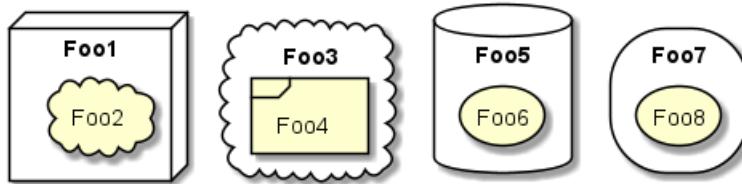


```
@startuml
node Foo1 {
    cloud Foo2
}

cloud Foo3 {
    frame Foo4
}

database Foo5 {
    storage Foo6
}

storage Foo7 {
    storage Foo8
}
@enduml
```



### 8.8.3 Full nesting

Here is all the nested elements:

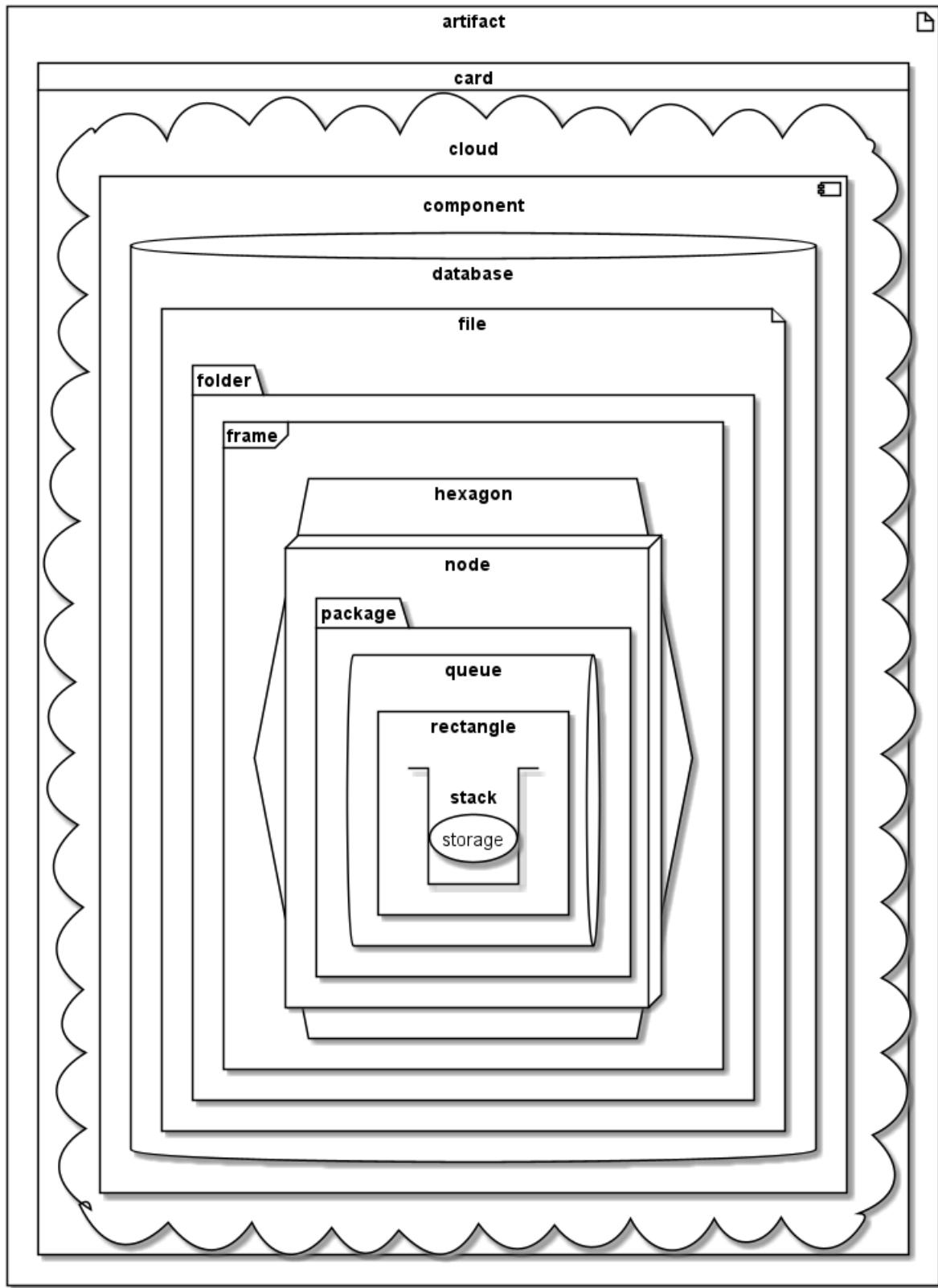
- by alphabetical order:

```
@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 {
```



```
}
```



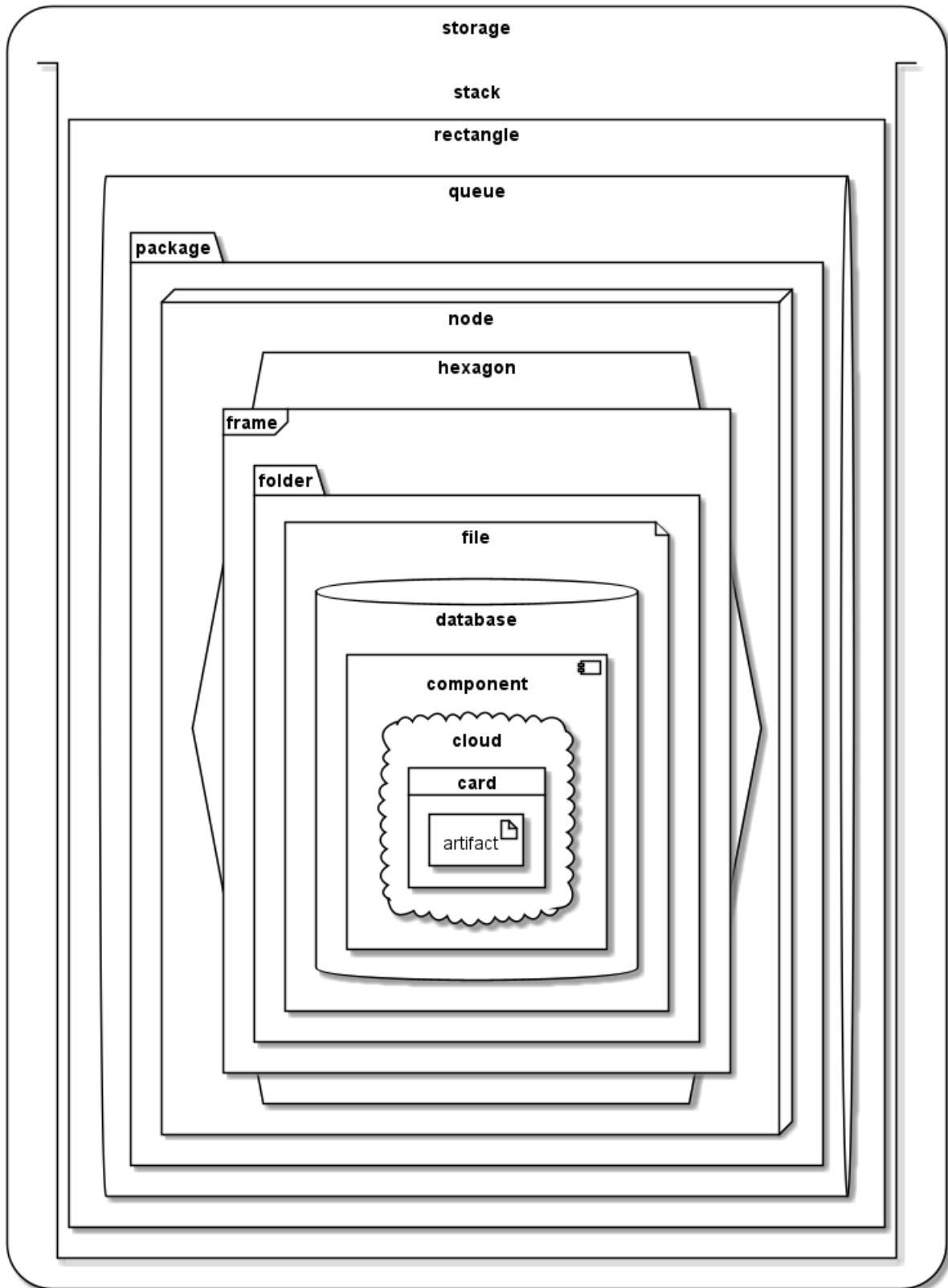


- or reverse alphabetical order

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







## 8.9 Alias

### 8.9.1 Simple alias with as

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

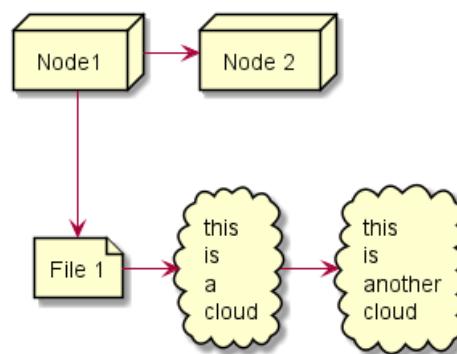


```

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

```



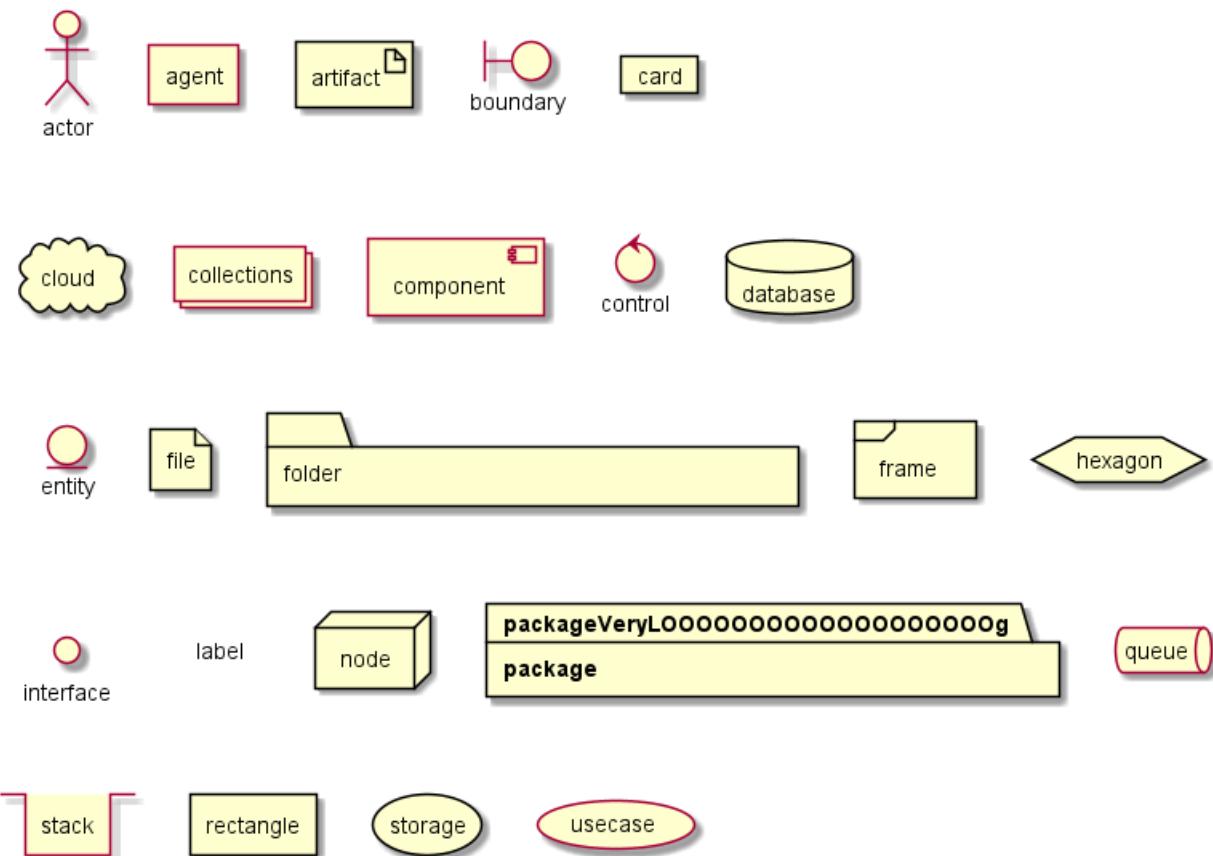
### 8.9.2 Examples of long alias

```

@startuml
actor      "actor"      as actorVeryL00000000000000000000000g
agent      "agent"       as agentVeryL00000000000000000000000g
artifact   "artifact"    as artifactVeryL00000000000000000000000g
boundary   "boundary"   as boundaryVeryL00000000000000000000000g
card       "card"        as cardVeryL00000000000000000000000g
cloud      "cloud"       as cloudVeryL00000000000000000000000g
collections "collections" as collectionsVeryL00000000000000000000000g
component   "component"  as componentVeryL00000000000000000000000g
control     "control"    as controlVeryL00000000000000000000000g
database   "database"   as databaseVeryL00000000000000000000000g
entity      "entity"     as entityVeryL00000000000000000000000g
file        "file"        as fileVeryL00000000000000000000000g
folder      "folder"     as folderVeryL00000000000000000000000g
frame       "frame"      as frameVeryL00000000000000000000000g
hexagon     "hexagon"    as hexagonVeryL00000000000000000000000g
interface   "interface"  as interfaceVeryL00000000000000000000000g
label       "label"       as labelVeryL00000000000000000000000g
node        "node"        as nodeVeryL00000000000000000000000g
package     "package"    as packageVeryL00000000000000000000000g
queue       "queue"      as queueVeryL00000000000000000000000g
stack       "stack"      as stackVeryL00000000000000000000000g
rectangle   "rectangle"  as rectangleVeryL00000000000000000000000g
storage     "storage"   as storageVeryL00000000000000000000000g
usecase     "usecase"   as usecaseVeryL00000000000000000000000g
@enduml

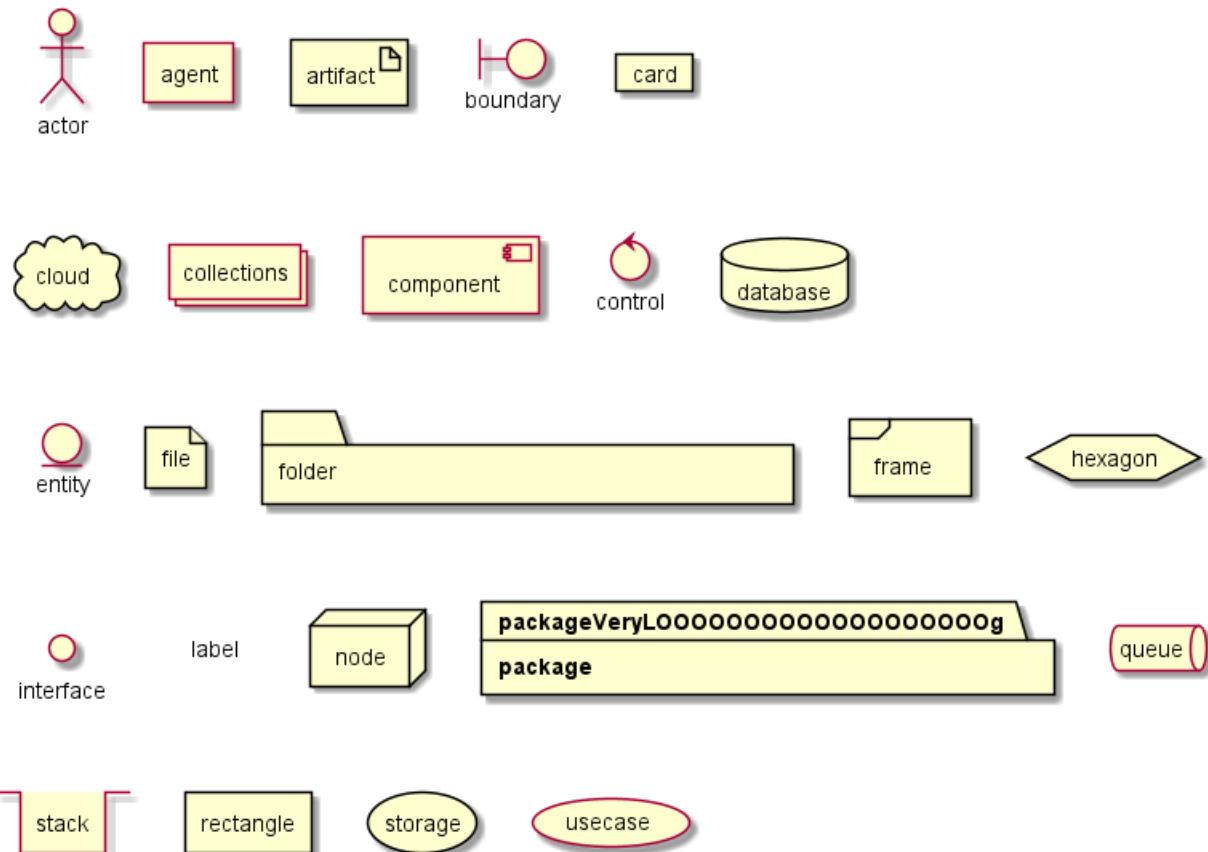
```





```
@startuml
actor      actorVeryLooooooooooooo0g          as "actor"
agent      agentVeryLooooooooooooo0g          as "agent"
artifact    artifactVeryLooooooooooooo0g        as "artifact"
boundary   boundaryVeryLooooooooooooo0g       as "boundary"
card       cardVeryLooooooooooooo0g           as "card"
cloud       cloudVeryLooooooooooooo0g          as "cloud"
collections collectionsVeryLooooooooooooo0g  as "collections"
component   componentVeryLooooooooooooo0g     as "component"
control     controlVeryLooooooooooooo0g        as "control"
database   databaseVeryLooooooooooooo0g       as "database"
entity      entityVeryLooooooooooooo0g         as "entity"
file        fileVeryLooooooooooooo0g           as "file"
folder      folderVeryLooooooooooooo0g         as "folder"
frame       frameVeryLooooooooooooo0g          as "frame"
hexagon     hexagonVeryLooooooooooooo0g        as "hexagon"
interface   interfaceVeryLooooooooooooo0g      as "interface"
label       labelVeryLooooooooooooo0g          as "label"
node        nodeVeryLooooooooooooo0g           as "node"
package     packageVeryLooooooooooooo0g        as "package"
queue       queueVeryLooooooooooooo0g          as "queue"
stack       stackVeryLooooooooooooo0g          as "stack"
rectangle   rectangleVeryLooooooooooooo0g      as "rectangle"
storage    storageVeryLooooooooooooo0g         as "storage"
usecase    usecaseVeryLooooooooooooo0g        as "usecase"
@enduml
```



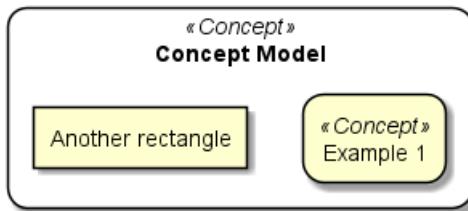


[Ref. QA-12082]

## 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

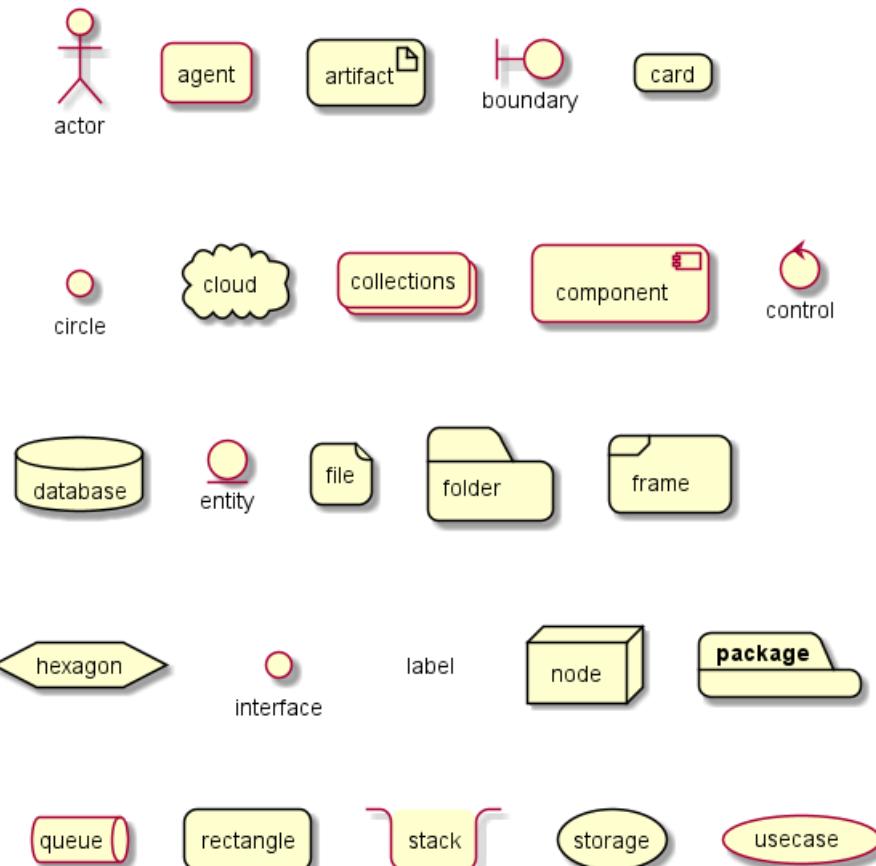
```
@startuml
skinparam roundCorner 15
actor actor
agent agent
```



```

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
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

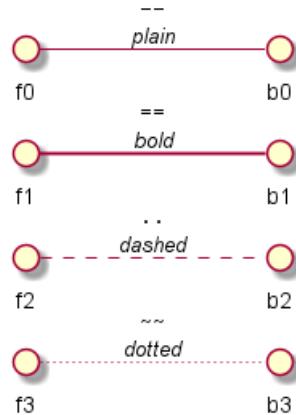
@startuml



left to right direction

skinparam nodesep 5

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



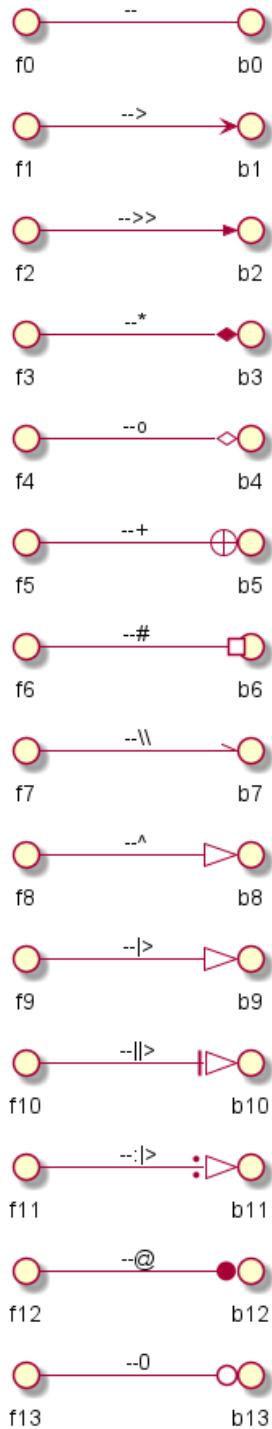
## 8.13 Appendix: All type of arrow head or '0' arrow

### 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
```





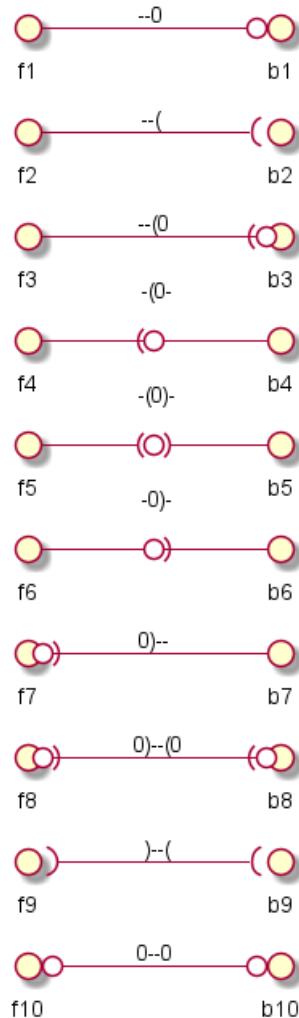
### 8.13.2 Type of '0' arrow or circle arrow

```
@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)-\n ""
f5 -(0)- b5 : "" -(0)-\n""
```



```
f4 -(0- b4 : "" -(0-\n ""
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

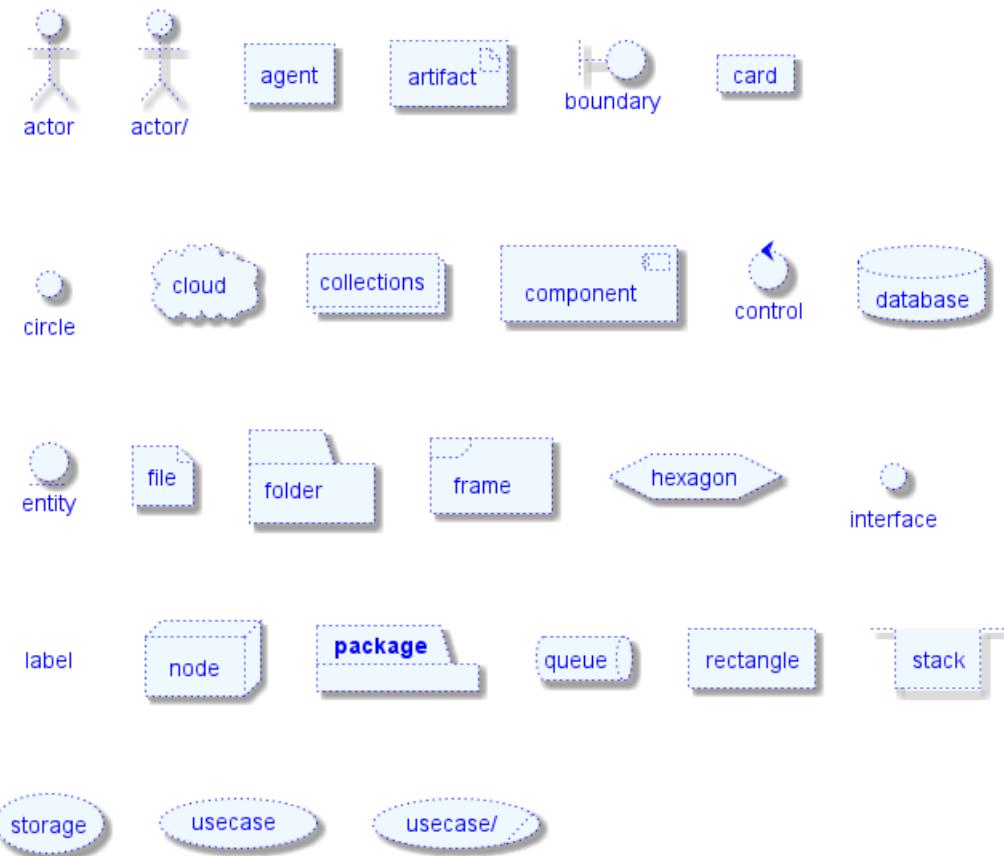
```
@startuml
actor actor #aliceblue;line:blue;line.dotted;text:blue
actor/ "actor/" #aliceblue;line:blue;line.dotted;text:blue
agent agent #aliceblue;line:blue;line.dotted;text:blue
artifact artifact #aliceblue;line:blue;line.dotted;text:blue
boundary boundary #aliceblue;line:blue;line.dotted;text:blue
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
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 {
}

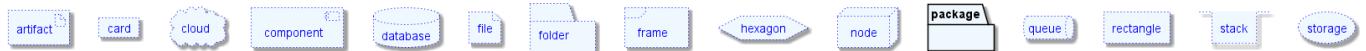
```



```

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      artifactVeryL00000000000000000000g      as "artifact" #aliceblue;line:blue;line.dotted;text:blue
file f1
}
card         cardVeryL00000000000000000000g      as "card" #aliceblue;line:blue;line.dotted;text:blue
file f2
}
cloud        cloudVeryL00000000000000000000g      as "cloud" #aliceblue;line:blue;line.dotted;text:blue
file f3
}
component    componentVeryL00000000000000000000g     as "component" #aliceblue;line:blue;line.dotted;text:blue
file f4
}
database    databaseVeryL00000000000000000000g      as "database" #aliceblue;line:blue;line.dotted;text:blue
file f5
}
file         fileVeryL00000000000000000000g      as "file" #aliceblue;line:blue;line.dotted;text:blue
file f6
}
folder       folderVeryL00000000000000000000g      as "folder" #aliceblue;line:blue;line.dotted;text:blue
file f7
}
frame        frameVeryL00000000000000000000g      as "frame" #aliceblue;line:blue;line.dotted;text:blue
file f8
}
hexagon     hexagonVeryL00000000000000000000g      as "hexagon" #aliceblue;line:blue;line.dotted;text:blue
file f9
}
node         nodeVeryL00000000000000000000g      as "node" #aliceblue;line:blue;line.dotted;text:blue
file f10
}
package     packageVeryL00000000000000000000g      as "package" #aliceblue;line:blue;line.dotted;text:blue
file f11
}

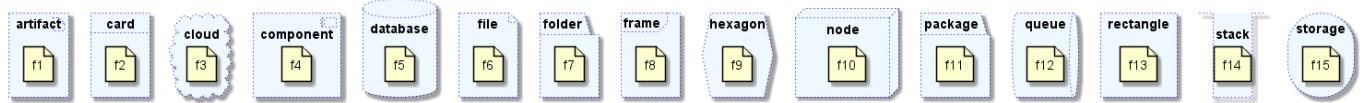
```



```

}
queue      queueVeryL0000000000000000000g      as "queue" #aliceblue;line:blue;line.dotted;text:bl
file f12
}
rectangle  rectangleVeryL0000000000000000000g   as "rectangle" #aliceblue;line:blue;line.dotted;text:bl
file f13
}
stack      stackVeryL0000000000000000000g      as "stack" #aliceblue;line:blue;line.dotted;text:bl
file f14
}
storage    storageVeryL0000000000000000000g     as "storage" #aliceblue;line:blue;line.dotted;text:bl
file f15
}
@enduml

```



## 8.15 Appendix: Test of style on all element

### 8.15.1 Simple element

### 8.15.2 Global style (on componentDiagram)

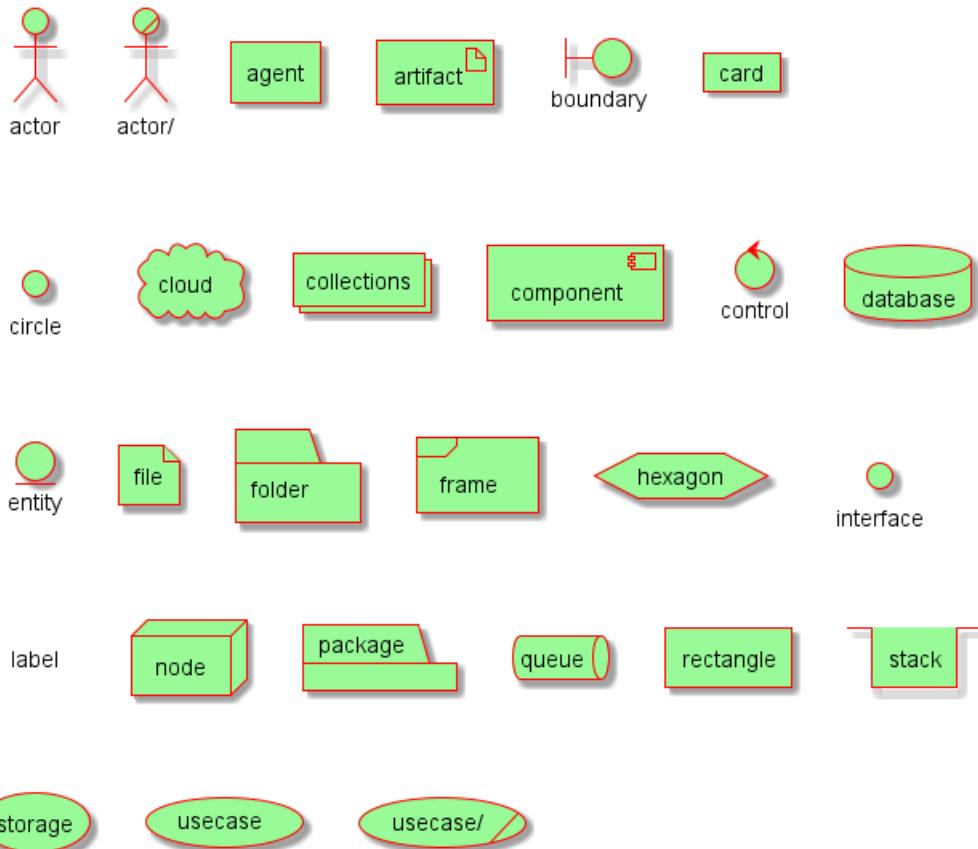
```

@startuml
<style>
componentDiagram {
    BackGroundColor palegreen
    LineThickness 1
    LineColor red
}
</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
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 {
```



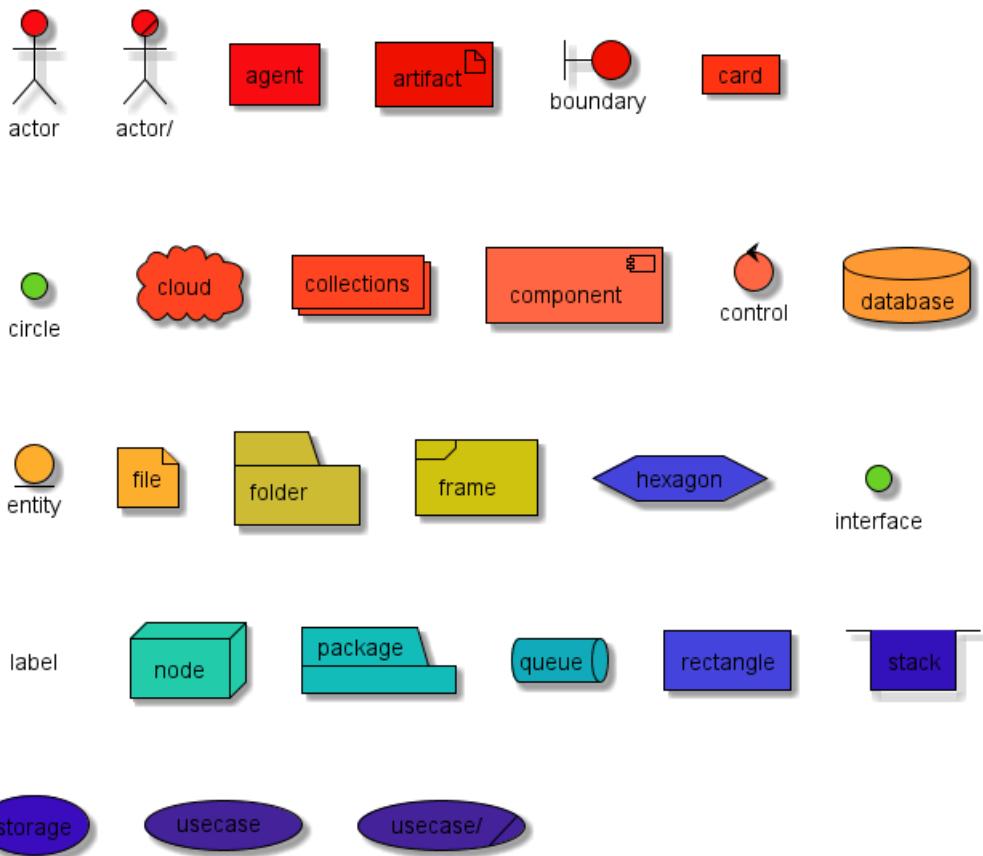
```
BackGroundColor #69d025
LineThickness 1
LineColor black
}
label {
    BackGroundColor black
    LineThickness 1
    LineColor black
}
node {
    BackGroundColor #22ccaa
    LineThickness 1
    LineColor black
}
package {
    BackGroundColor #12bdb9
    LineThickness 1
    LineColor black
}
queue {
    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
queue queue
rectangle rectangle
stack stack
storage storage
usecase usecase
usecase/ "usecase/"
@enduml

```



#### 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
}
</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" {

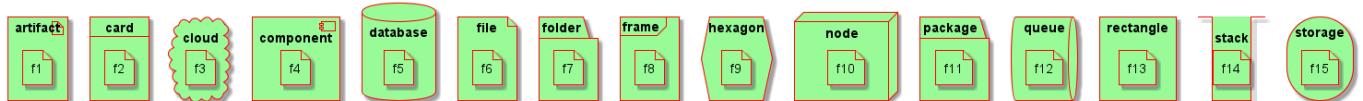
```



```

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
}

```



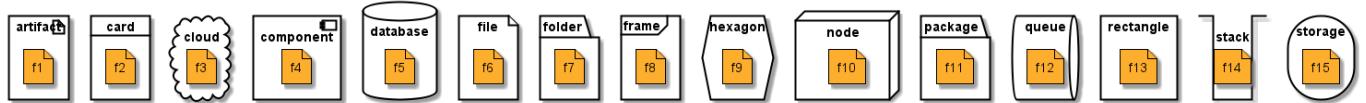
```
component {  
    BackGroundColor #ff6644  
    LineThickness 1  
    LineColor black  
}  
database {  
    BackGroundColor #ff9933  
    LineThickness 1  
    LineColor black  
}  
file {  
    BackGroundColor #feae2d  
    LineThickness 1  
    LineColor black  
}  
folder {  
    BackGroundColor #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

```



## 9 Диаграмма состояний

### 9.1 Простое состояние

Для изображения начального и конечного псевдосостояний используется [\*].

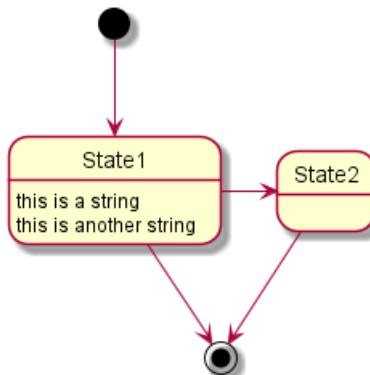
Используйте --> для изображения переходов.

```
@startuml
```

```
[*] --> State1
State1 --> [*]
State1 : this is a string
State1 : this is another string

State1 -> State2
State2 --> [*]
```

```
@enduml
```

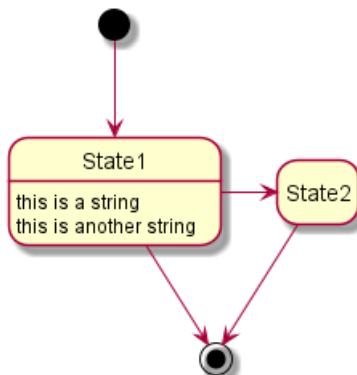


### 9.2 Change state rendering

You can use hide empty description to render state as simple box.

```
@startuml
hide empty description
[*] --> State1
State1 --> [*]
State1 : this is a string
State1 : this is another string

State1 -> State2
State2 --> [*]
@enduml
```



### 9.3 Составное состояние

Также можно изображать составные состояния. Для этого его следует объявить, используя конструкцию state { ... }.

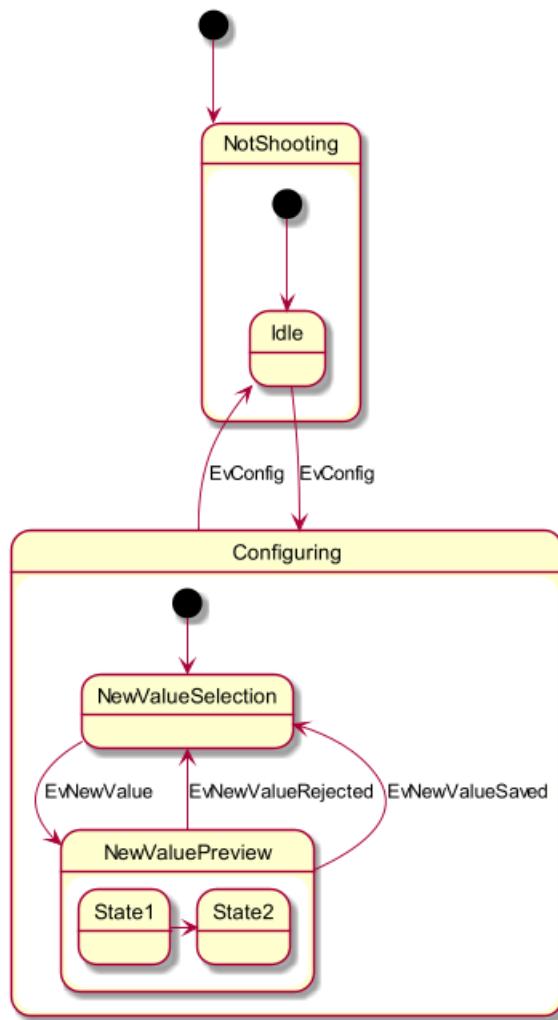
```
@startuml
scale 350 width
[*] --> NotShooting

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 Длинные имена

Вы также можете использовать ключевое слово `state` для сокращения длинного имени состояния.

```

@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

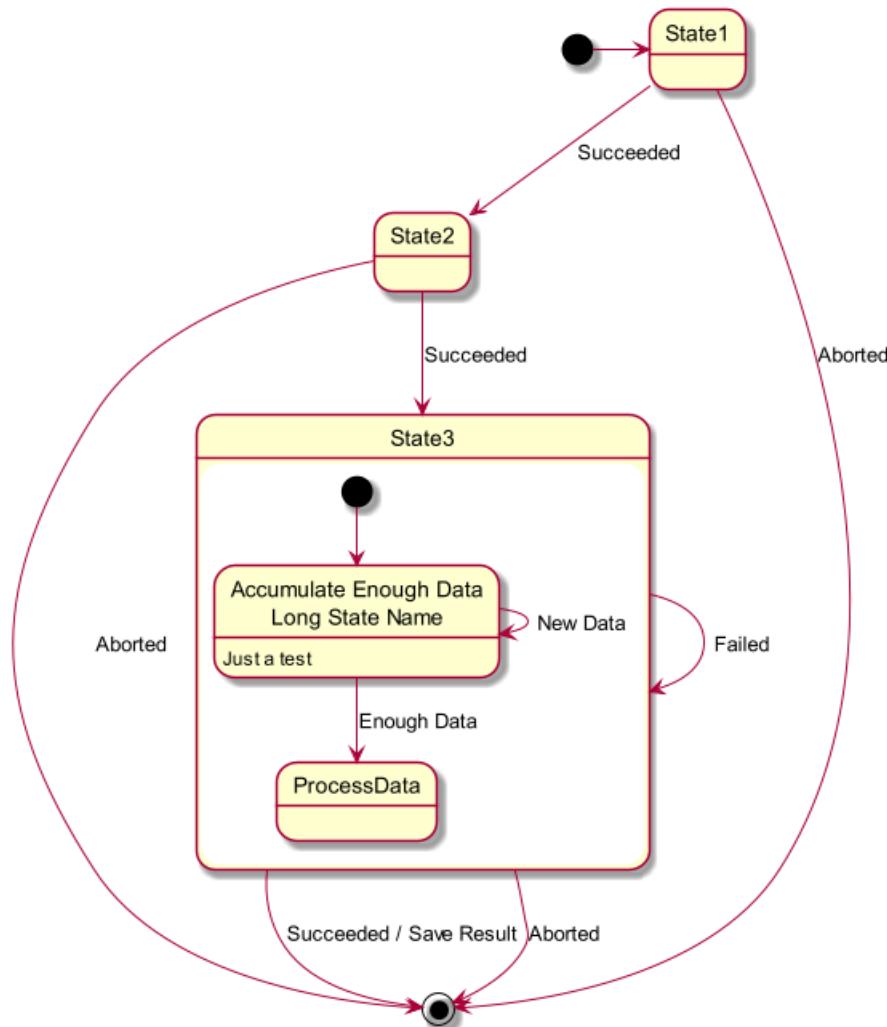
```

```

@enduml

```





## 9.5 History [[H], [H\*]]

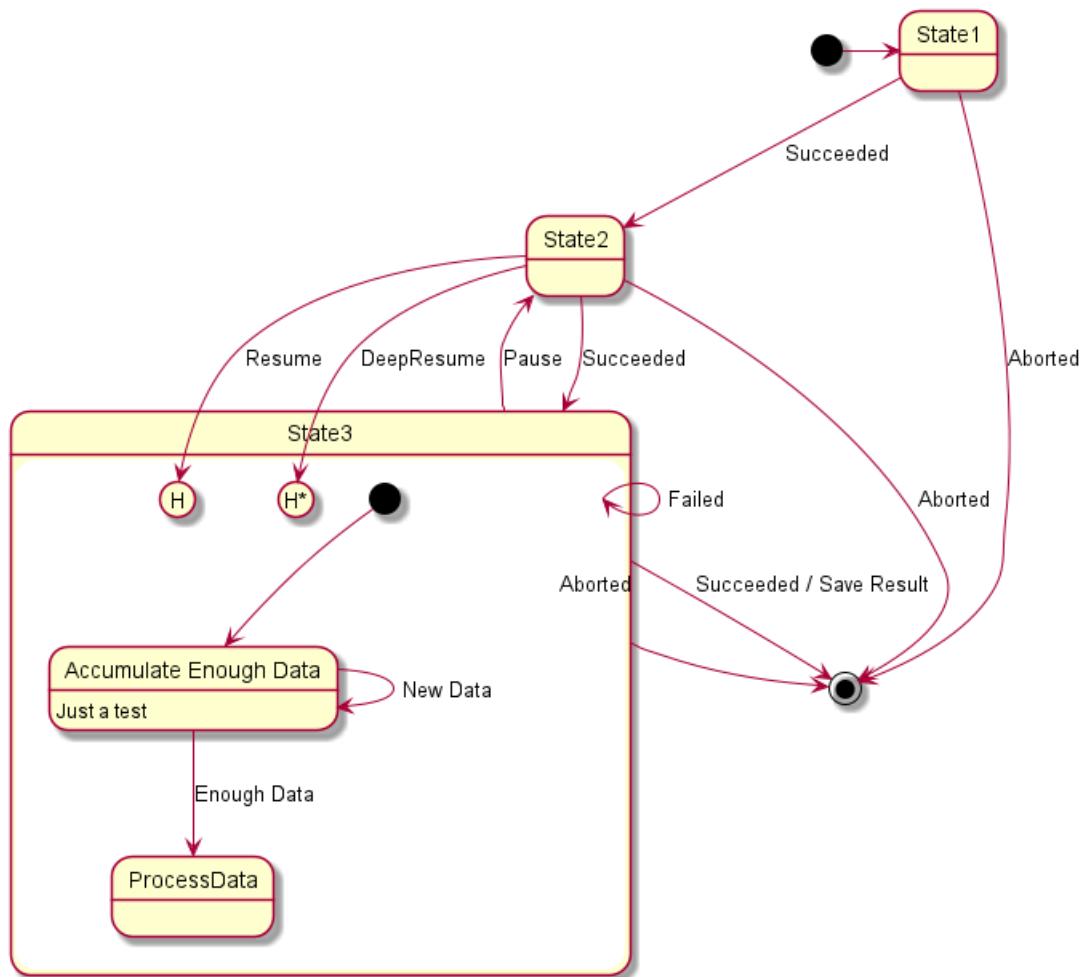
You can use `[H]` for the history and `[H*]` for the deep history of a substate.

```

@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

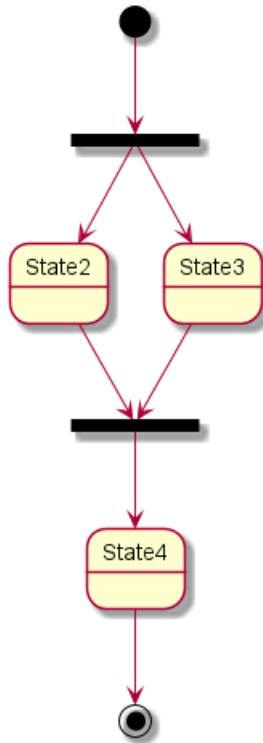
```

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 Параллельные состояния

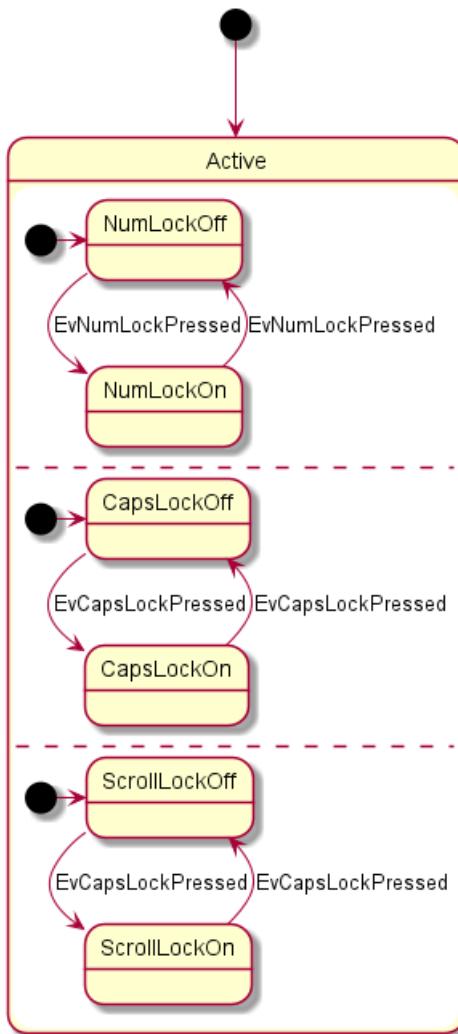
Используя оператор -- или ||, вы можете объявлять параллельные подсостояния внутри составного состояния.

```
@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





## 9.8 Conditional [choice]

The stereotype <<choice>> can be used to use conditional state.

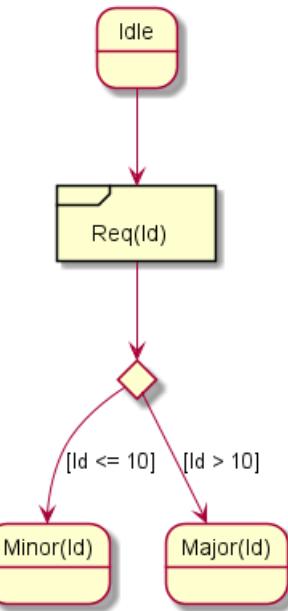
```

@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 [choice, fork, join, end]

```

@startuml
state choice1 <<choice>>
state fork1    <<fork>>
state join2    <<join>>
state end3     <<end>>

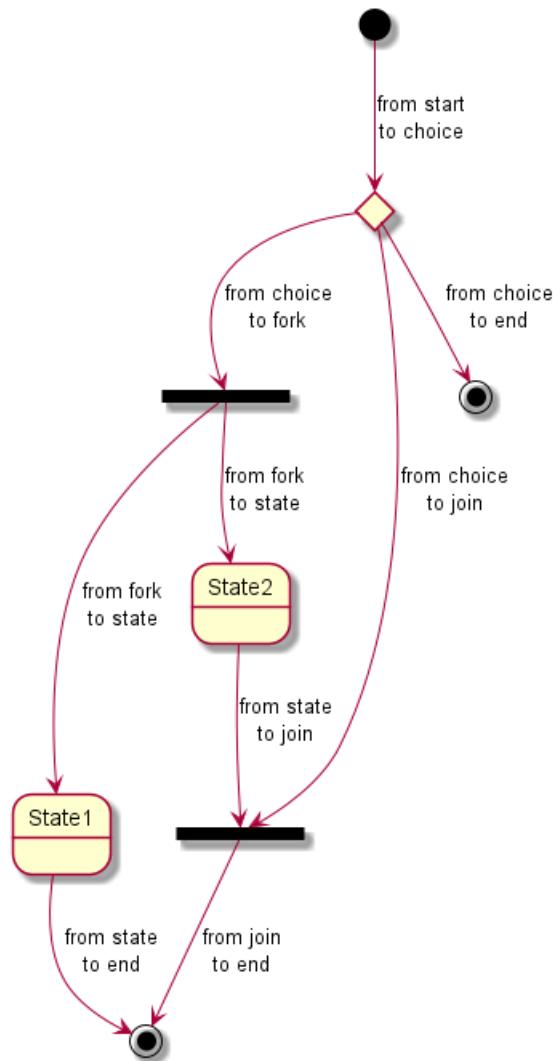
[*]      --> choice1 : from start\nto choice
choice1 --> fork1   : from choice\nto fork
choice1 --> join2   : from choice\nto join
choice1 --> end3    : from choice\nto end

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 and QA-1159]

## 9.10 Point [entryPoint, exitPoint]

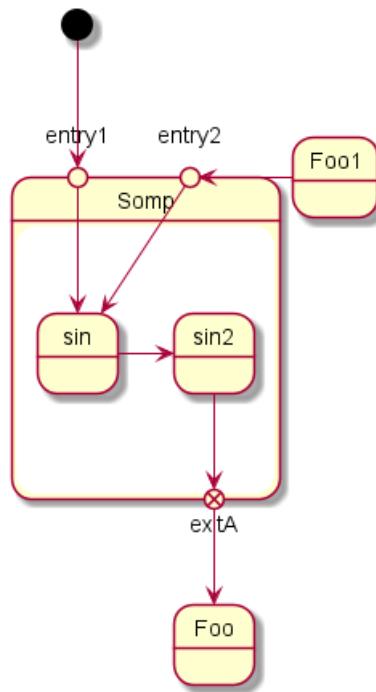
You can add point with <<entryPoint>> and <<exitPoint>> stereotypes:

```

@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]

You can added **pin** with `<<inputPin>>` and `<<outputPin>>` stereotypes:

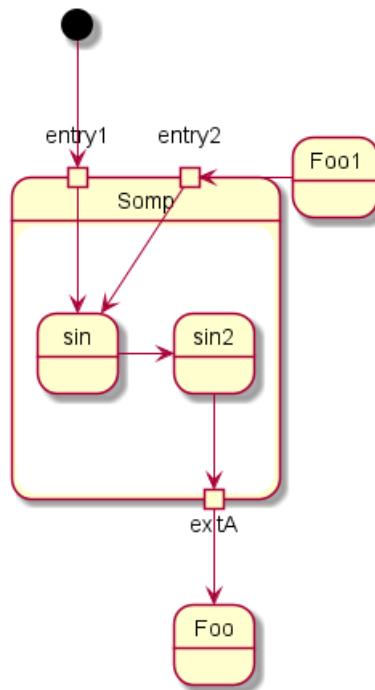
```

@startuml
state Somp {
    state entry1 <<inputPin>>
    state entry2 <<inputPin>>
    state sin
    state sin2
    entry1 --> sin
    entry2 -> sin
    sin -> sin2
    sin2 --> exitA <<outputPin>>
}

[*] --> entry1
exitA --> Foo
Foo1 -> entry2
@enduml

```





[Ref. QA-4309]

## 9.12 Expansion [expansionInput, expansionOutput]

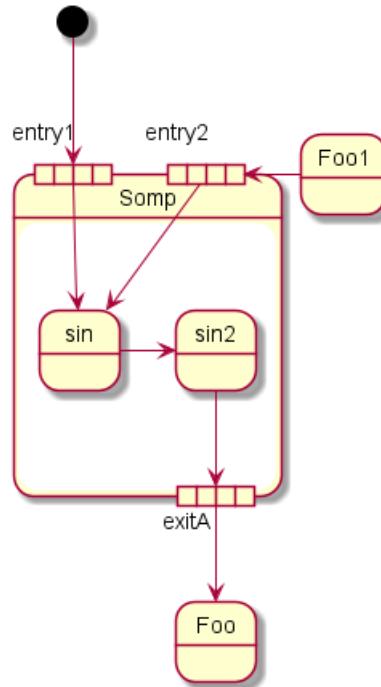
You can added **expansion** with <<expansionInput>> and <<expansionOutput>> stereotypes:

```

@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 Направления стрелок

Для изображения стрелок перехода горизонтально используется оператор `->`. Следующий синтаксис позволяет задать другое направление.

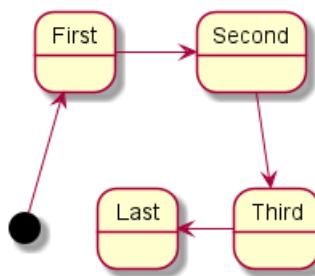
- `-down->` (default arrow)
- `-right->` or `->`
- `-left->`
- `-up->`

`@startuml`

```

[*] -up-> First
First -right-> Second
Second --> Third
Third -left-> Last
  
```

`@enduml`



Вы также можете сокращать слова в описании стрелок (например, `-d->` или `-do->` вместо `-down->`).

Не следует злоупотреблять этой функциональностью: *GraphViz* в большинстве случаев дает хороший результат без лишних манипуляций.

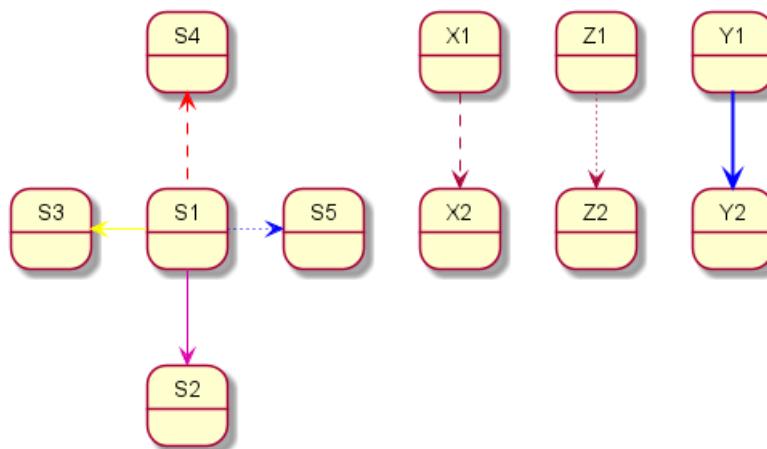


## 9.14 Change line color and style

You can change line color and/or line style.

```
@startuml
State S1
State S2
State S3
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 Заметки

К состоянию можно добавлять заметки, используя специальные ключевые слова: note left of, note right of, note top of, note bottom of .

Заметки можно определять в несколько строк.

```
@startuml
```

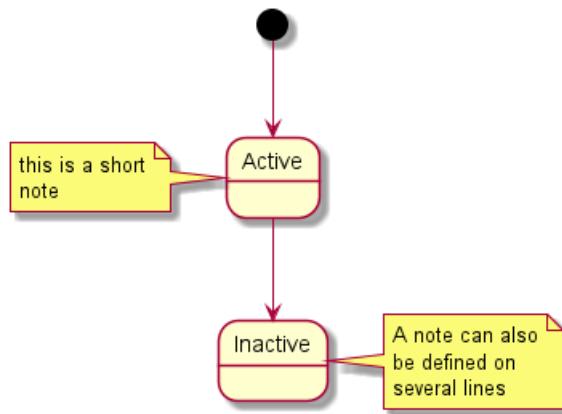
```
[*] --> Active
Active --> Inactive

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
```





Можно создавать заметки, не привязанные ни к какому объекту.

@startuml

```
state foo
note "This is a floating note" as N1
```

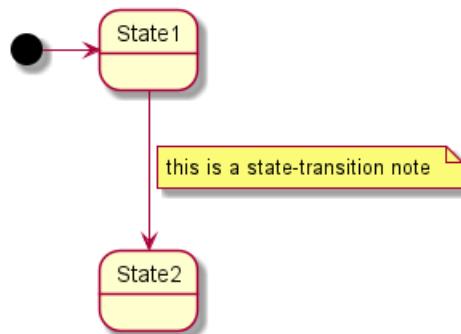
@enduml



## 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 Еще о заметках

Также заметки можно прикреплять к составным состояниям.

@startuml

```
[*] --> NotShooting
state "Not Shooting State" as NotShooting {
```



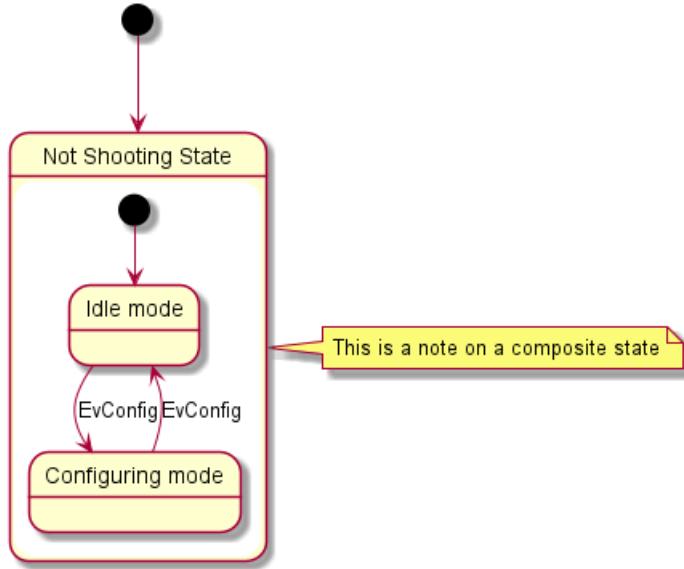
```

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

```



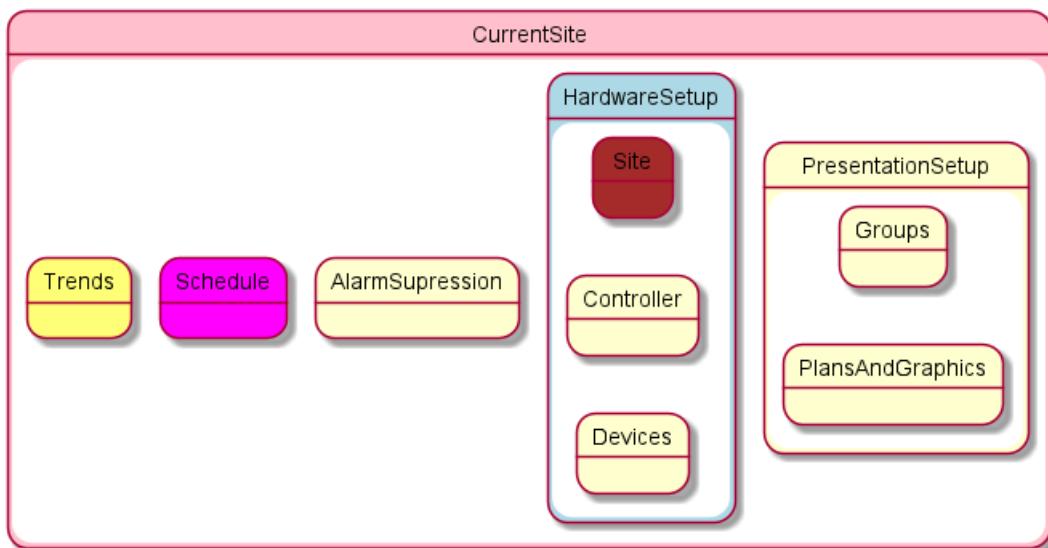
## 9.18 Inline color

```

@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

Вы можете использовать команду `skinparam` для изменения шрифтов и цветов диаграммы

Вы можете использовать данную команду :

- В определении диаграммы, как любую другую команду,
- В подключенном файле,
- В конфигурационном файле, указанном в командной строке в задании ANT.

Вы можете задавать цвета и шрифты для именованных шаблонов состояний.

```

@startuml
skinparam backgroundColor LightYellow
skinparam state {
    StartColor MediumBlue
    EndColor Red
    BackgroundColor Peru
    BackgroundColor<<Warning>> Olive
    BorderColor Gray
    FontName Impact
}

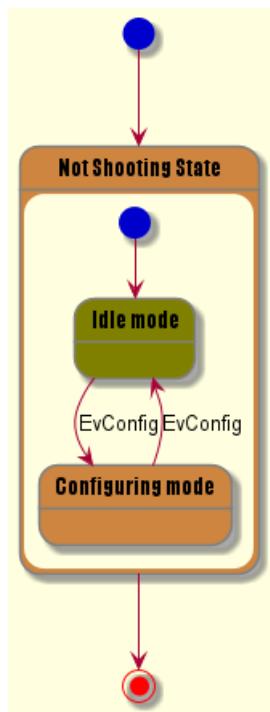
[*] --> NotShooting

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

```

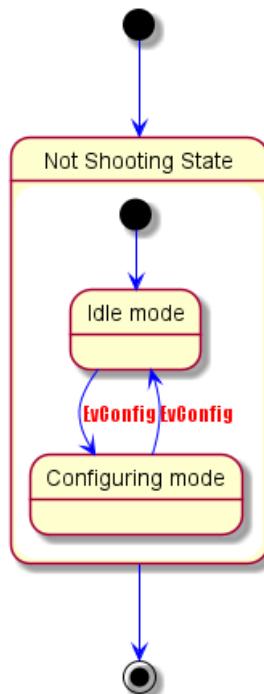
state "Not Shooting State" as NotShooting {
    state "Idle mode" as Idle <<Warning>>
    state "Configuring mode" as Configuring
    [*] --> Idle
    Idle --> Configuring : EvConfig
    Configuring --> Idle : EvConfig
}

```

NotShooting --> [\*]

@enduml





## 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`

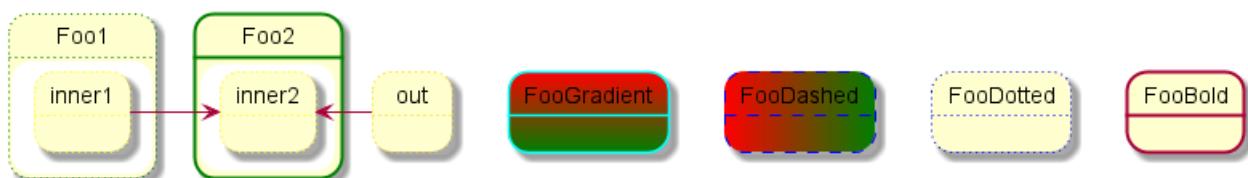
With background color first (`#color`), then line style and line color (`##[style]color`).

```

@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]

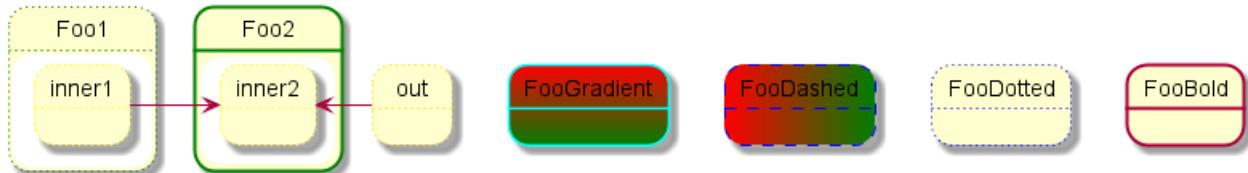
- #color;line:color;line.[bold|dashed|dotted];text:color

**TODO:**FIXME ☐ text:color seems not to be taken into account **TODO:**FIXME

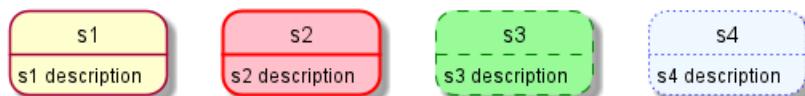
```
@startuml
@startuml
state FooGradient #red-green;line:00FFFF
state FooDashed #red|green;line.dashed;line:blue {
}
state FooDotted #line.dotted;line:blue {
}
state FooBold #line.bold {
}
state Foo1 #line.dotted;line:green {
state inner1 #line.dotted;line:yellow
}

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]



## 10 Timing Diagram

This is still under construction. You can propose new features if you need some.

### 10.1 Declaring participant

You declare participant using the following keywords, depending on how you want them to be drawn.

- **concise:** A simplified signal designed to show the movement of data (great for messages).
- **robust:** A complex line signal designed to show the transition from one state to another (can have many states).
- **clock:** A 'clocked' signal that repeatedly transitions from high to low
- **binary:** A specific signal restricted to only 2 states (binary).

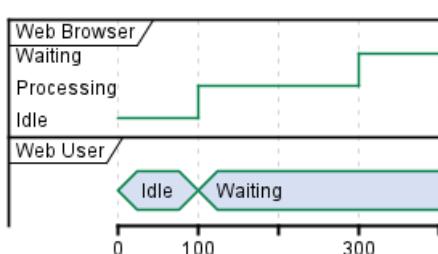
You define state change using the @ notation, and the is verb.

```
@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
```



### 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
```

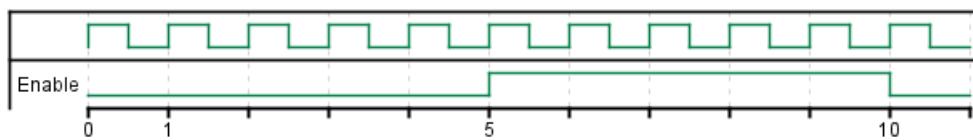
```
@0
EN is low
```

```
@5
EN is high
```

```
@10
```



EN is low  
@enduml



### 10.3 Adding message

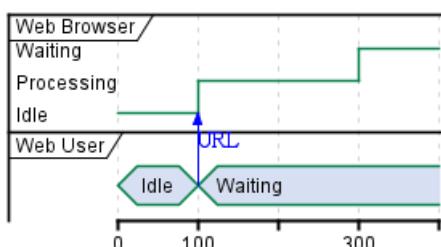
You can add message using the following syntax.

```
@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
```

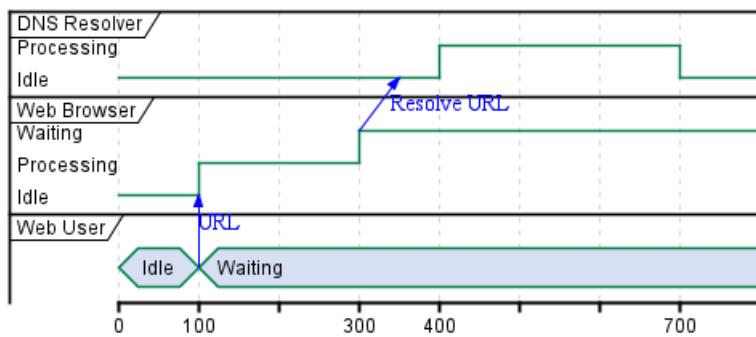
```
@+200
WB is Waiting
```



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 `@XX as :<anchor point name>` 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
```

```
@:start
EN is low
db is "0x0000"
```

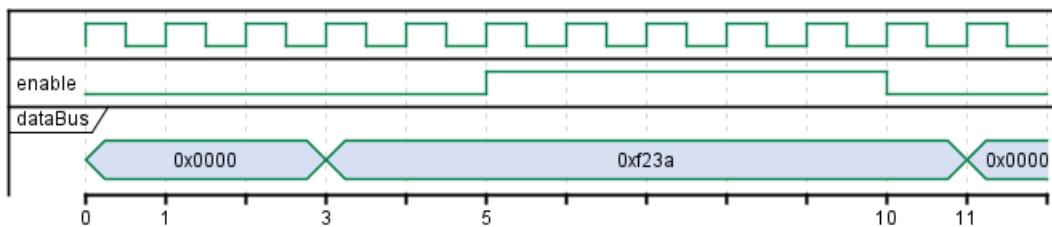
```
@:en_high
EN is high
```

```
@:en_low
EN is low
```

```
@:en_high-2
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
```

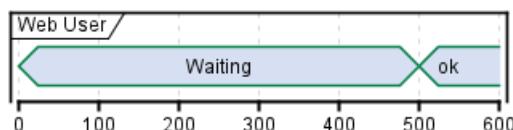


## 10.7 Setting scale

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
```



## 10.8 Initial state

You can also define an initial state.

```
@startuml
robust "Web Browser" as WB
```

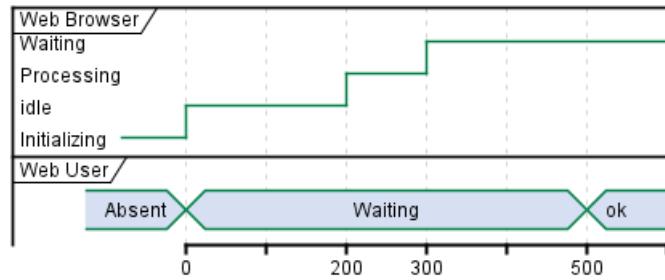


concise "Web User" as WU

WB is Initializing  
WU is Absent

@WB  
0 is idle  
+200 is Processing  
+100 is Waiting

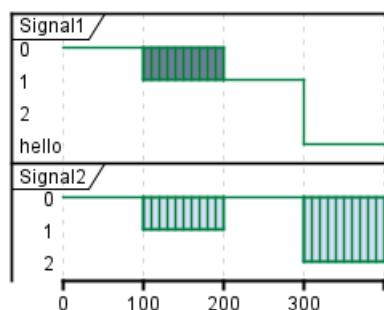
@WU  
0 is Waiting  
+500 is ok  
@enduml



## 10.9 Intricated state

A signal could be in some undefined state.

```
@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
```



## 10.10 Hidden state

It is also possible to hide some state.

```
@startuml
concise "Web User" as WU

@0
WU is {-}

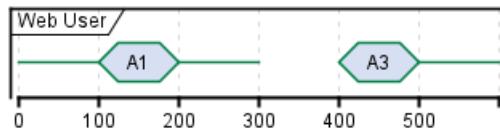
@100
WU is A1

@200
WU is {-}

@300
WU is {hidden}

@400
WU is A3

@500
WU is {-}
@enduml
```



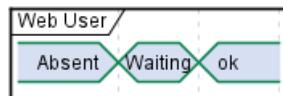
## 10.11 Hide time axis

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

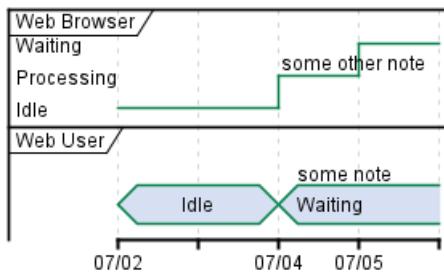
WU is Waiting : some note

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

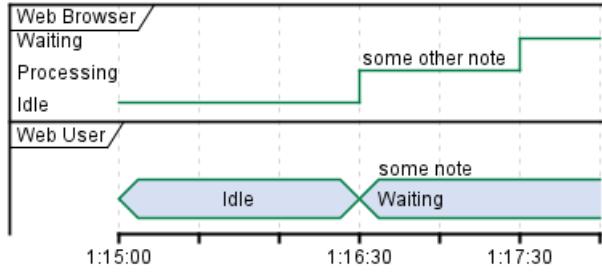
WU is Waiting : some note

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

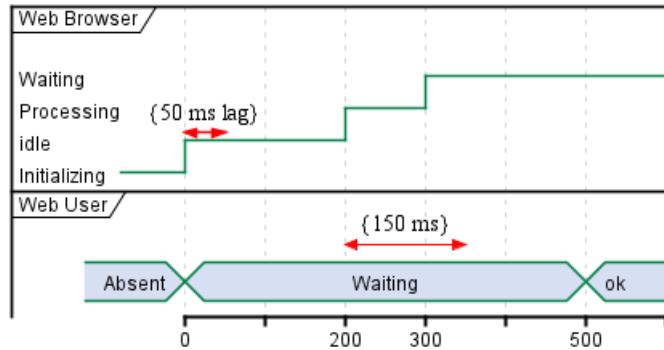
0 is idle

+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 Highlighted period

You can highlight a part of diagram.

```
@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.

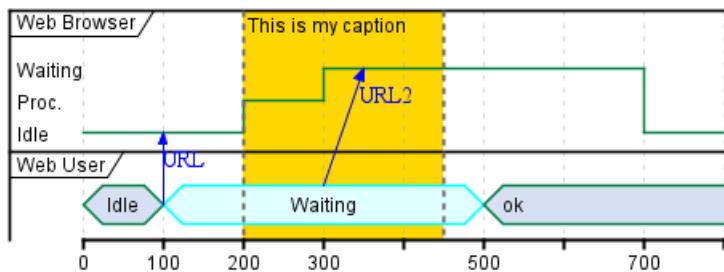
@300
WU -> WB@350 : URL2
WB is Waiting

@+200
WU is ok

@+200
WB is Idle

highlight 200 to 450 #Gold;line:DimGrey : This is my caption
@enduml
```





## 10.15 Adding texts

You can optionally add a title, a header, a footer, a legend and a caption:

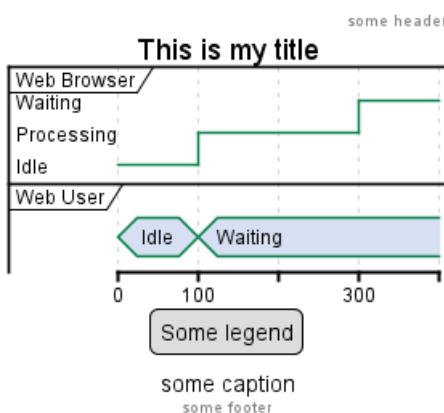
```
@startuml
Title This is my title
header: some header
footer: some footer
legend
Some legend
end legend
caption some caption

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
```



## 10.16 Complete example

Thanks to Adam Rosien for this example.

```
@startuml
concise "Client" as Client
concise "Server" as Server
```



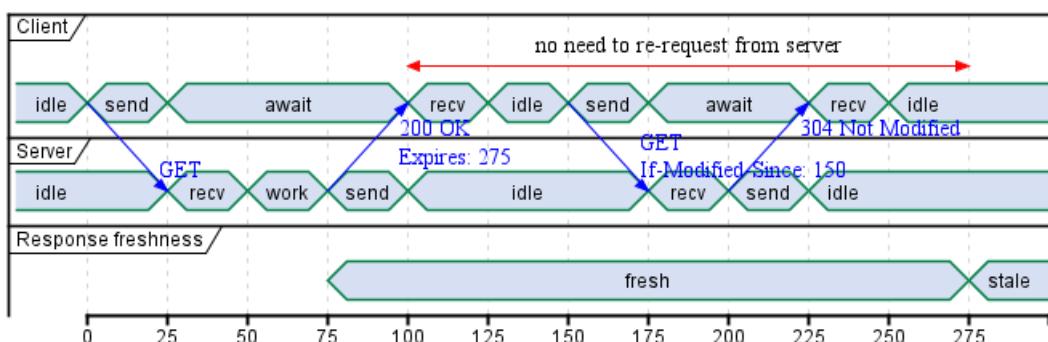
concise "Response freshness" as Cache

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
```



## 10.17 Digital Example

```
@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"

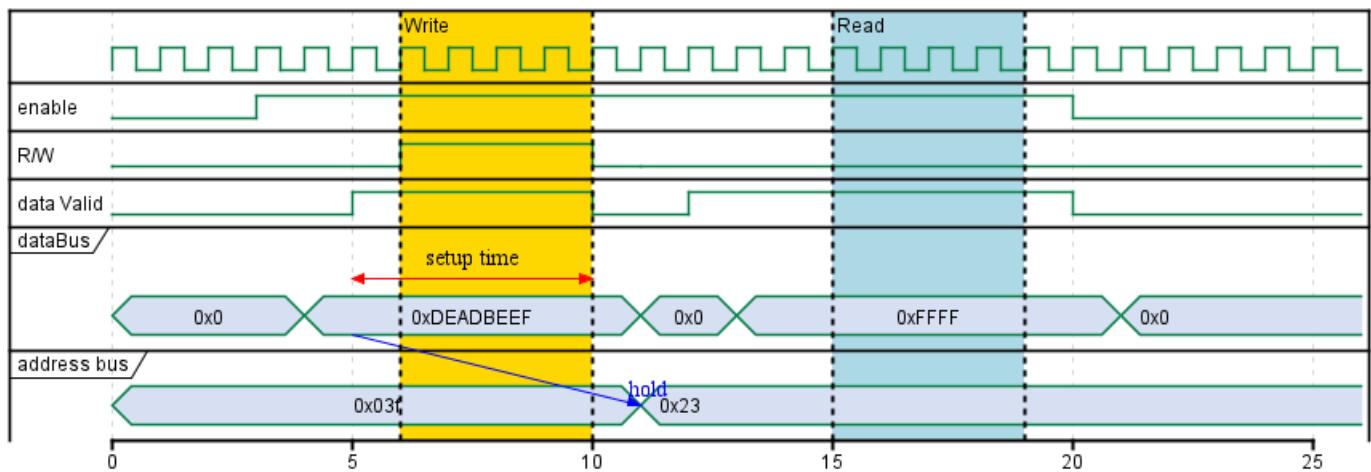
@12
dv is high
@13
db is "0xFFFF"

@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
```





## 10.18 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]



## 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"
}
@endjson
```

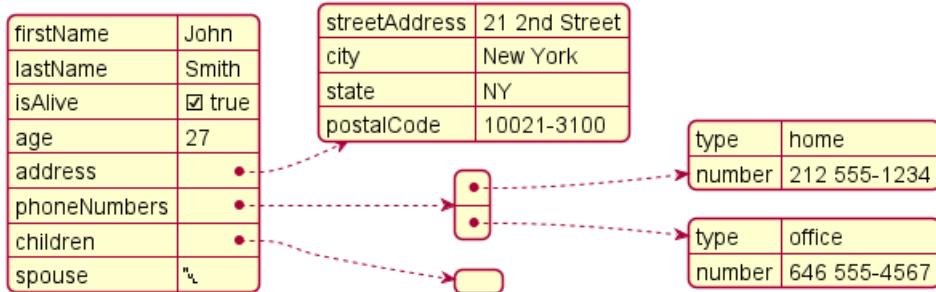
fruit	Apple
size	Large
color	Red

### 11.1 Complex example

You can use complex JSON structure.

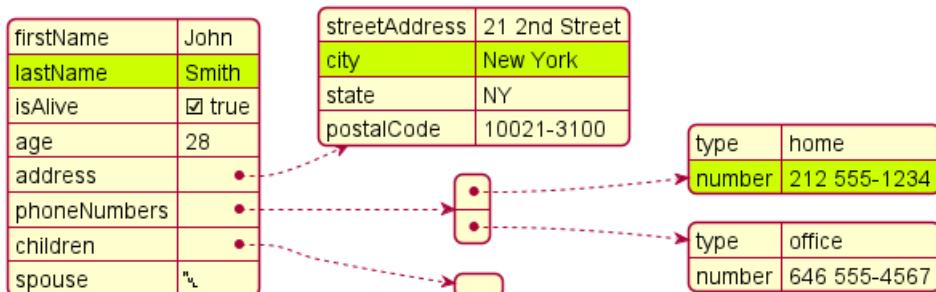
```
@startjson
{
    "firstName": "John",
    "lastName": "Smith",
    "isAlive": true,
    "age": 27,
    "address": {
        "streetAddress": "21 2nd Street",
        "city": "New York",
        "state": "NY",
        "postalCode": "10021-3100"
    },
    "phoneNumbers": [
        {
            "type": "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
```



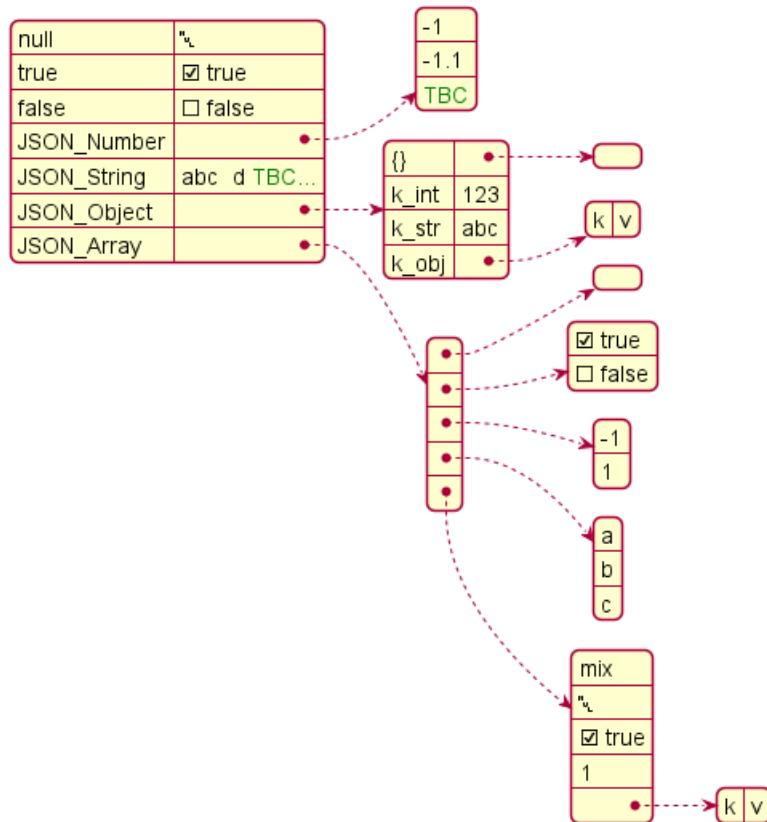
## 11.3 JSON basic element

### 11.3.1 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
```



## 11.4 JSON array or table

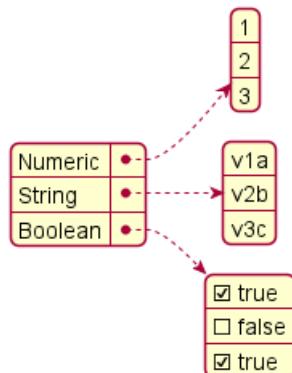
### 11.4.1 Array type

```
@startjson
{
  "Numeric": [1, 2, 3],
  "String": ["v1a", "v2b", "v3c"],
  "Boolean": [true, false, true]
```



```
}
```

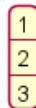
@endjson



#### 11.4.2 Minimal array or table

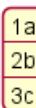
#### 11.4.3 Number array

```
@startjson
[1, 2, 3]
@endjson
```



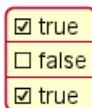
#### 11.4.4 String array

```
@startjson
["1a", "2b", "3c"]
@endjson
```



#### 11.4.5 Boolean array

```
@startjson
[true, false, true]
@endjson
```

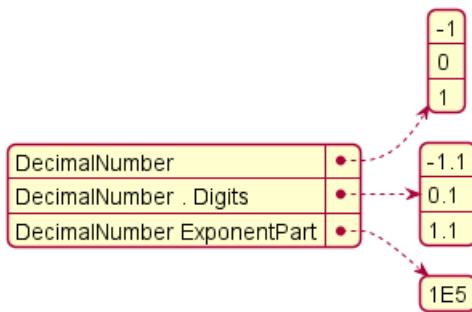


## 11.5 JSON numbers

```
@startjson
{
  "DecimalNumber": [-1, 0, 1],
  "DecimalNumber . Digits": [-1.1, 0.1, 1.1],
  "DecimalNumber ExponentPart": [1E5]
}
```



```
@endjson
```



## 11.6 JSON strings

### 11.6.1 JSON Unicode

On JSON you can use Unicode directly or by using escaped form like .

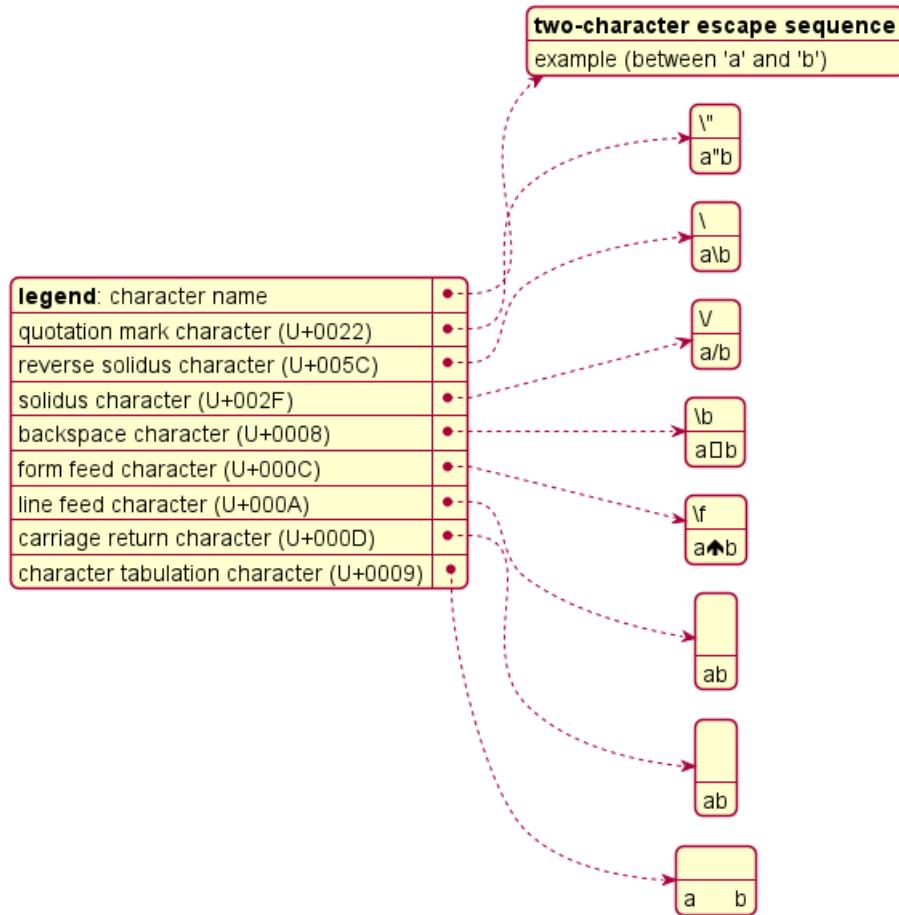
```
@startjson
{
    "<color:blue><b>code": "<color:blue><b>value",
    "a\\u005Cb": "a\u005Cb",
    "\\uD83D\\uDE10": "\uD83D\uDE10",
    " ":
}
@endjson
```

code	value
a\u005Cb	a'b
\uD83D\uDE10	😊
😊	😊

### 11.6.2 JSON two-character escape sequence

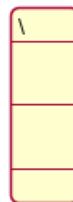
```
@startjson
{
    "**legend**: character name": ["**two-character escape sequence**", "example (between
    "quotation mark character (U+0022)": ["\\\"", "a\"b"],
    "reverse solidus character (U+005C)": ["\\\\\\\", "a\\\"b"],
    "solidus character (U+002F)": ["\\\\\\/", "a\\/b"],
    "backspace 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 ☐ **TODO:** FIXME

```
@startjson
[
  "\\\\",
  "\\n",
  "\\r",
  "\\t"
]
@endjson
```



## 11.7 Minimal JSON examples

```
@startjson
"Hello world!"
@endjson
```

Hello world!

```
@startjson
```



42

@endjson

42

```
@startjson
true
@endjson
```

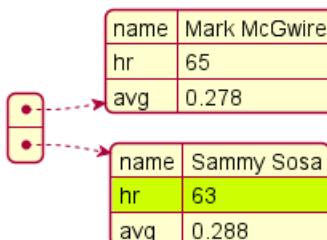
 true

(Examples come from STD 90 - Examples)

## 11.8 Using (global) style

### 11.8.1 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
```



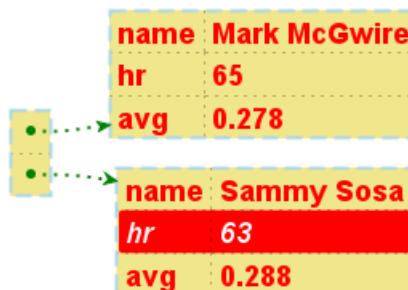
### 11.8.2 With style

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]



## 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:

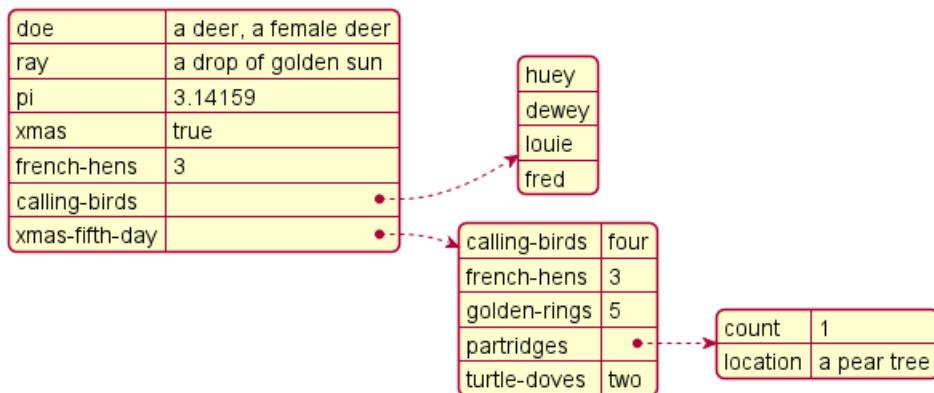
- begin with `@startyaml` keyword
- end with `@endyaml` keyword.

```
@startyaml
fruit: Apple
size: Large
color: Red
@endyaml
```

fruit	Apple
size	Large
color	Red

### 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
```

@fruit	Apple
\$size	Large
&color	Red
♥	Heart
%	Per mille

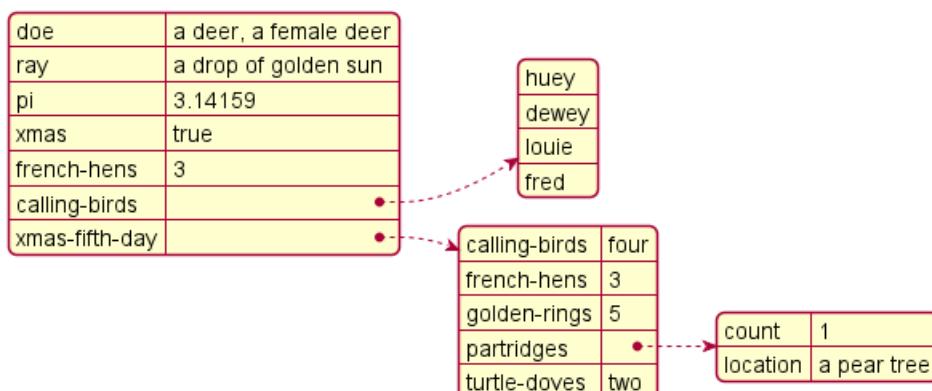
[Ref. QA-13376]

## 12.3 Highlight parts

### 12.3.1 Normal style

```
@startyaml
#highlight "french-hens"
#highlight "xmas-fifth-day" / "partridges"

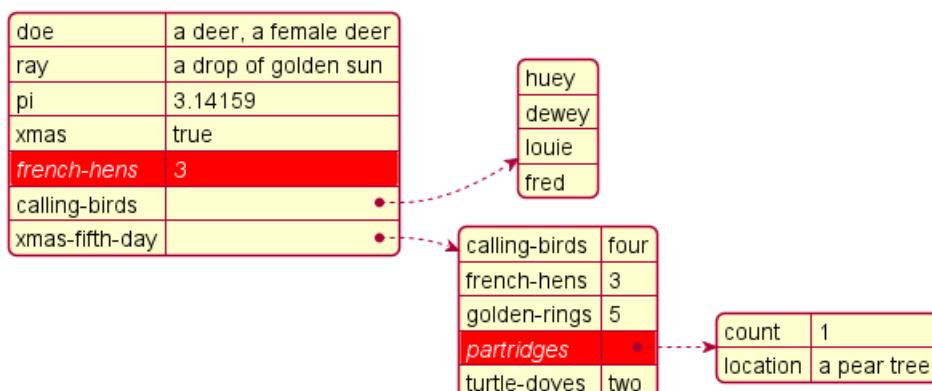
doe: "a deer, a female deer"
ray: "a drop of golden sun"
pi: 3.14159
xmas: true
french-hens: 3
calling-birds:
- huey
- dewey
- louie
- fred
xmas-fifth-day:
calling-birds: four
french-hens: 3
golden-rings: 5
partridges:
count: 1
location: "a pear tree"
turtle-doves: two
@endyaml
```



### 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 (global) style

### 12.4.1 Without style (by default)

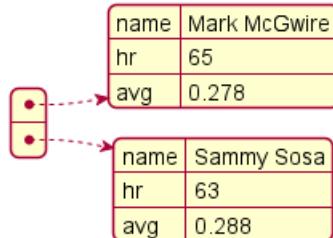
```
@startyaml
-
  name: Mark McGwire
  hr: 65
  avg: 0.278
```



```

-
  name: Sammy Sosa
  hr: 63
  avg: 0.288
@endyaml

```



### 12.4.2 With style

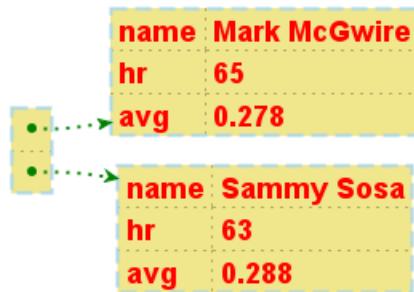
You can use style to change rendering of elements.

```

@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

```





[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!

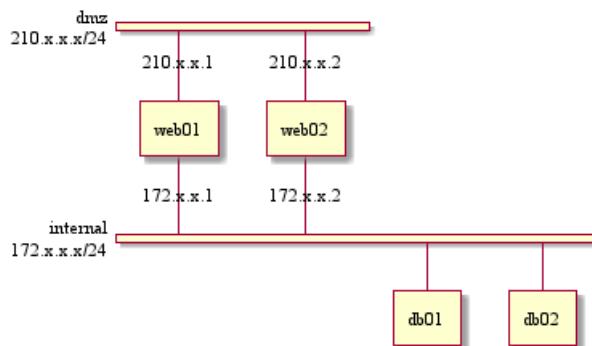
Since the syntax is clear and simple, this has been integrated within PlantUML. We reuse here the examples that Takeshi has documented.

### 13.1 Simple diagram

```
@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;
    }
}
```

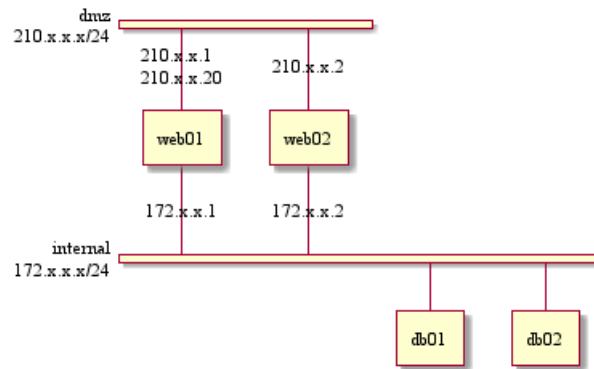


```

    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"];
        }
    }

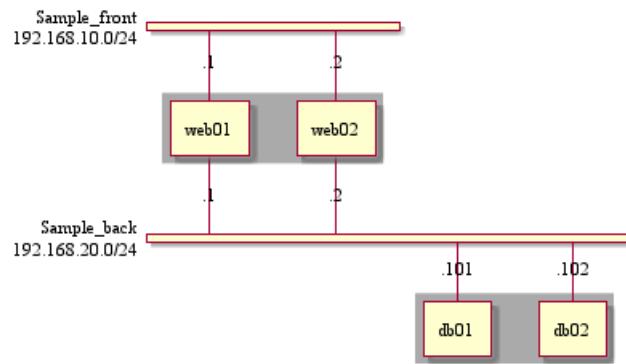
    network Sample_back {
        address = "192.168.20.0/24";
        web01 [address = ".1"];
        web02 [address = ".2"];
        db01 [address = ".101"];
        db02 [address = ".102"];

        // define network using defined nodes
        group db {
            db01;
            db02;
        }
    }
}

@enduml

```



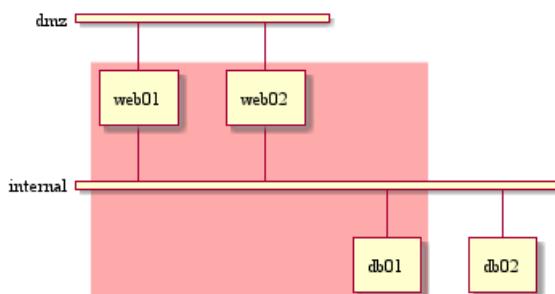


### 13.3.2 Define group outside of network definitions

```

@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 {
  
```



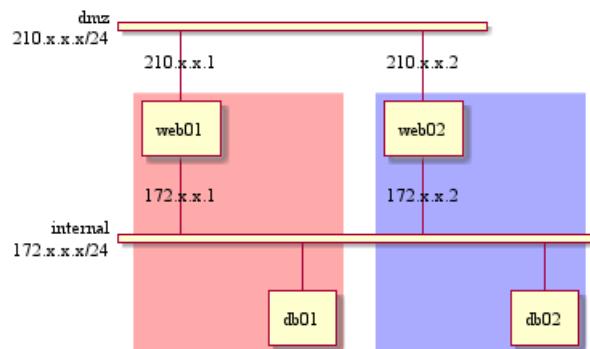
```

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;
}
}
```

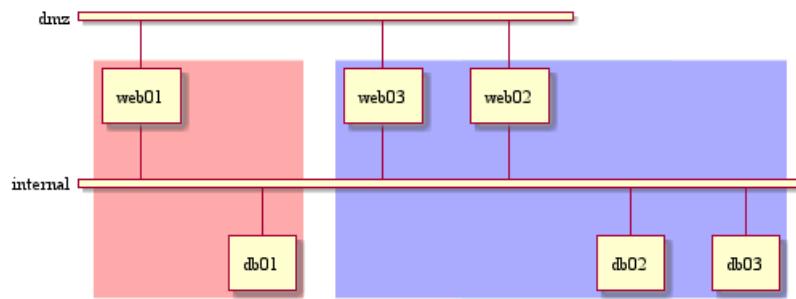


```

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"
    }
}

```



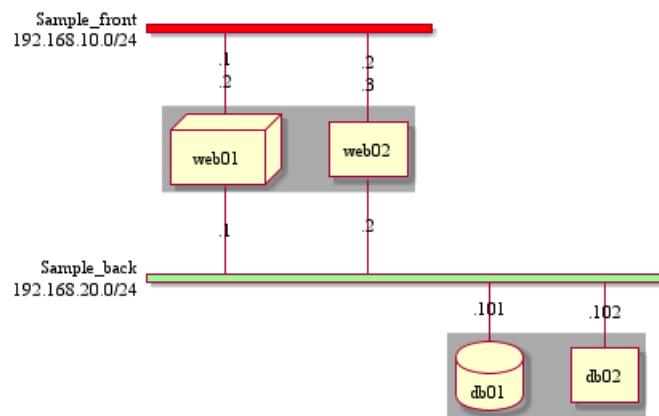
```

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.

```

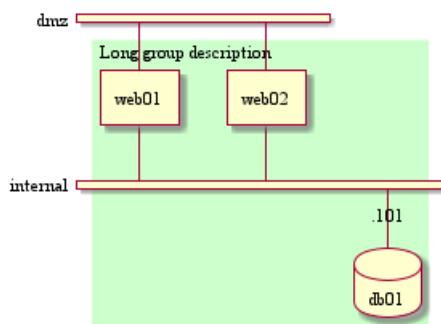
@startuml
nwdiag {
    group {
        color = "#CCFFCC";
        description = "Long group description";

        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, to make a new line, or any other Creole syntax.

```

@startuml
!include <office/Servers/application_server>
!include <office/Servers/database_server>

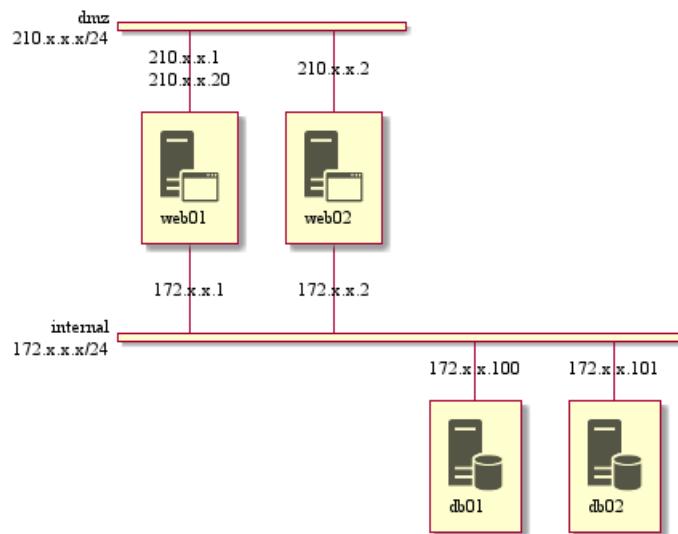
nwdiag {
    network dmz {
        address = "210.x.x.x/24"

        // 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-II862]

## 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 `\n` 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"

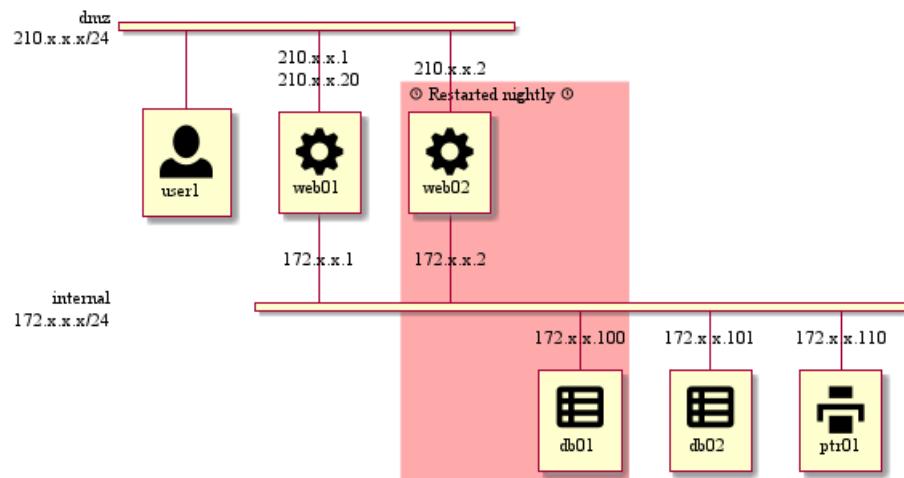
        user [description = "<&person*4.5>\n user1"];
        // set multiple addresses (using comma)
        web01 [address = "210.x.x.1, 210.x.x.20", description = "<&cog*4>\nweb01"]
        web02 [address = "210.x.x.2", description = "<&cog*4>\nweb02"];

    }
    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;
    }

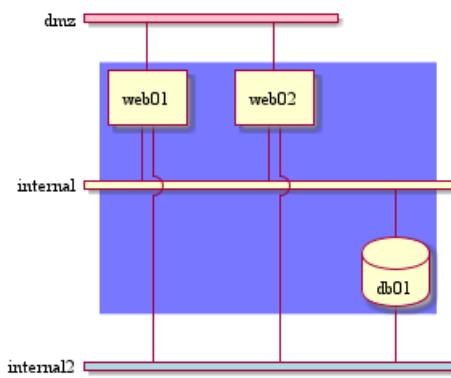
    network internal {
        web01;
        web02;
        db01 [shape = database ];
    }

    network internal2 {
        color = "LightBlue";

        web01;
        web02;
        db01;
    }
}
```

**enduml**



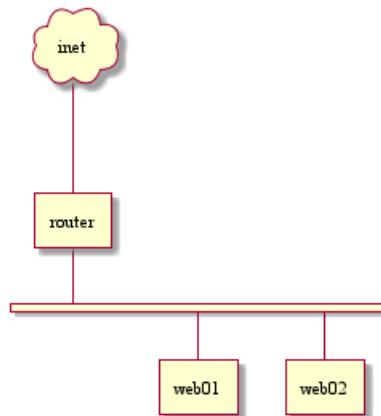


## 13.8 Peer networks

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
```



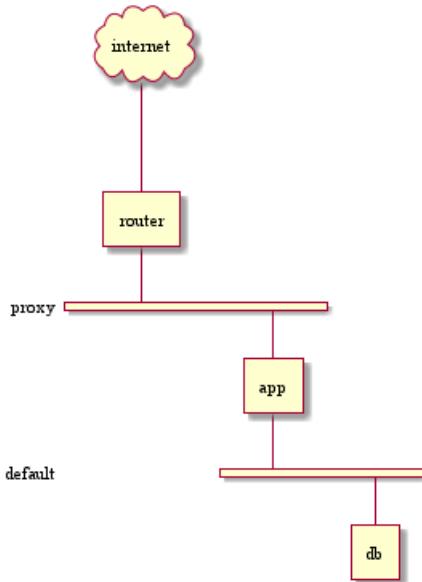
## 13.9 Peer networks and group

### 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

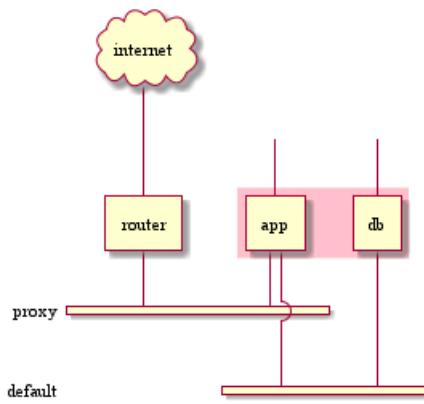
```
@startuml
nwdiag {
    internet [ shape = cloud];
    internet -- router;

    group {
        color = "pink";
        app;
        db;
    }

    network proxy {
        router;
        app;
    }

    network default {
        app;
        db;
    }
}
@enduml
```

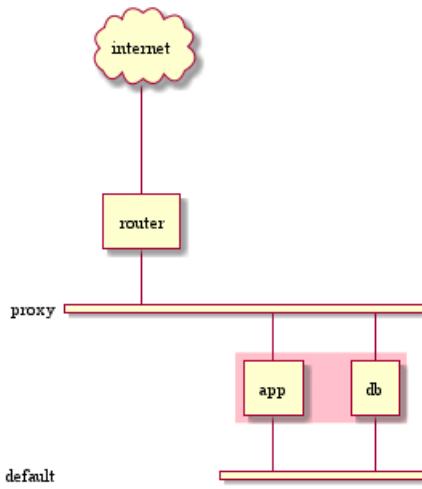




### 13.9.3 Group on second

```
@startuml  
nwdiag {  
    internet [ shape = cloud];  
    internet -- router;  
  
    network proxy {  
        router;  
        app;  
    }  
  
    group {  
        color = "pink";  
        app;  
        db;  
    }  
  
    network default {  
        app;  
        db;  
    }  
}  
@enduml
```



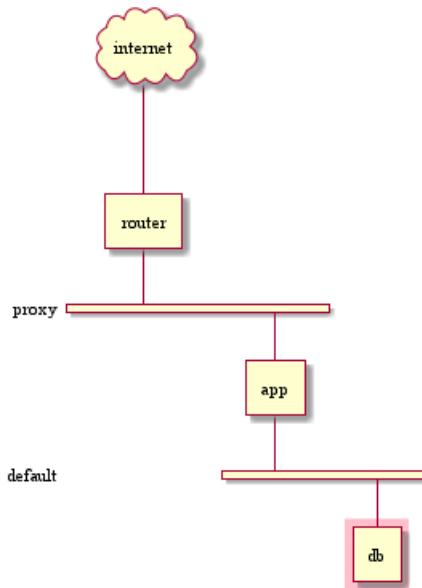


**TODO:** FIXME Why the line on proxy for 'db'? ('db' must be only on 'default network') [See example without group]

#### 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
```





**TODO:** FIXME [Ref. Issue#408 and QA-12655] **TODO:** Not totally fixed

### 13.10 Add title, caption, header, footer or legend on network diagram

```
@startuml
```

```
header some header
```

```
footer some footer
```

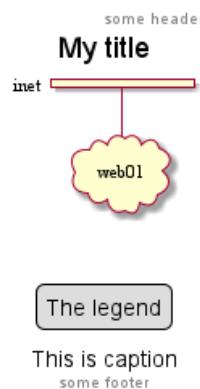
```
title My title
```

```
nwdiag {
    network inet {
        web01 [shape = cloud]
    }
}
```

```
legend
The legend
end legend
```

```
caption This is caption
@enduml
```





[Ref. QA-11303 and Common commands]

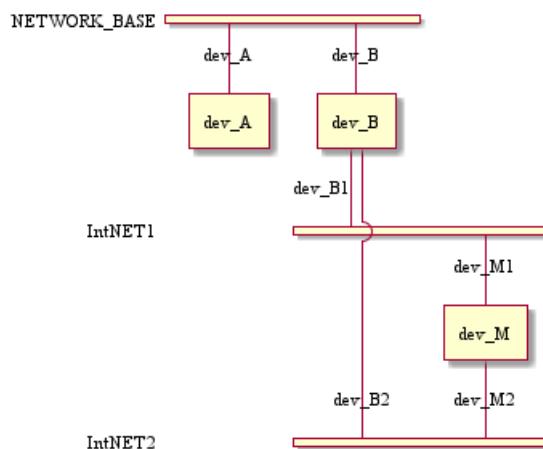
### 13.11 Change width of the networks

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
```

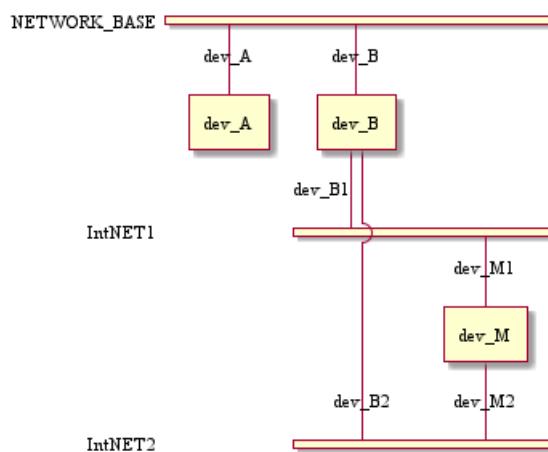


- only the first

```
@startuml
```



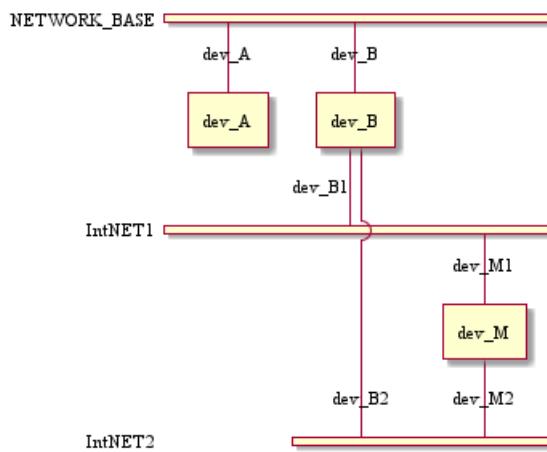
```
nwdiag {
    network NETWORK_BASE {
        width = full
        dev_A [address = "dev_A" ]
        dev_B [address = "dev_B" ]
    }
    network IntNET1 {
        dev_B [address = "dev_B1" ]
        dev_M [address = "dev_M1" ]
    }
    network IntNET2 {
        dev_B [address = "dev_B2" ]
        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
```



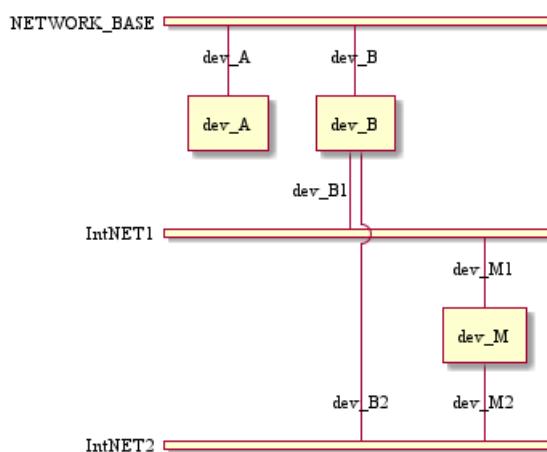


- all the network (with same full width)

```

@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

```

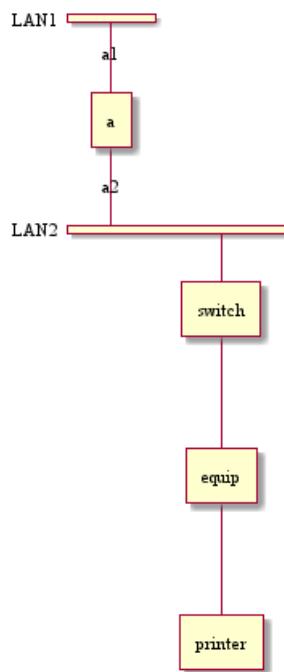


## 13.12 Other internal networks

You can define other internal networks (TCP/IP, USB, SERIAL,...).

- Without address or type

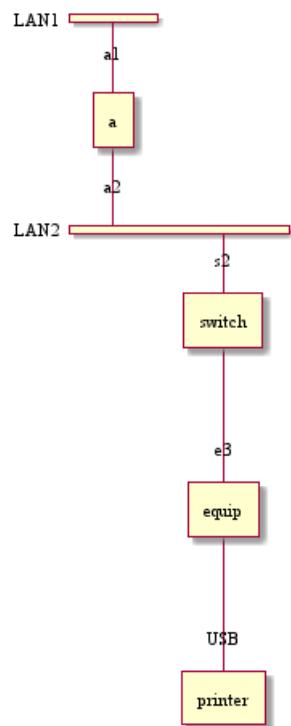
```
@startuml
nwdiag {
    network LAN1 {
        a [address = "a1"];
    }
    network LAN2 {
        a [address = "a2"];
        switch;
    }
    switch -- equip;
    equip -- printer;
}
@enduml
```



- 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]



## 14 Salt (Каркасная схема)

**Salt** - это подпроект, включенный в PlantUML и призванный помочь вам проектировать графический интерфейс или иначе - Каркасную, Контурную, Проволочную схему (диаграмму).

Вы можете использовать ключевое слово @startsalt или @startuml, после которого с новой строки стоит ключевое слово salt.

### 14.1 Простые виджеты

Окно должно начинаться и заканчиваться скобками. Вы можете определить:

- Кнопку, используя [ и ].
- Radio button (переключатель), используя ( и ).
- Checkbox (флажок), используя [ и ].
- Поле ввода текста, используя ".
- Раскрывающийся список (Droplist), используя ^.

```
@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
```



Цель этого инструмента - обсуждать простые и типовые окна.

### 14.2 Использование сетки

Таблица автоматически создаётся, когда вы используете открывающую скобку {.

Ещё вам нужно использовать | для деления на колонки.

Например:

```
@startsalt
{
    Login | "MyName"
    Password | "*****"
    [Cancel] | [ OK ]
}
@endsalt
```



Login	<input type="text" value="MyName"/>
Password	<input type="password" value="****"/>
<input type="button" value="Cancel"/>	<input type="button" value="OK"/>

Сразу после открывающей скобки вы можете использовать символ, чтобы определить, где закончится строка и начнётся колонка сетки:

Symbol	Result
#	Чтобы показать вертикальные и горизонтальные линии
!	Чтобы показать вертикальные линии
-	Чтобы показать горизонтальные линии
+	Чтобы показать внешние линии

```
@startsalt
{+
    Login | "MyName"
    Password | "****"
    [Cancel] | [ OK ]
}
@endsalt
```

Login	<input type="text" value="MyName"/>
Password	<input type="password" value="****"/>
<input type="button" value="Cancel"/>	<input type="button" value="OK"/>

## 14.3 Группа

Виджеты могут быть объединены в группу со своим наименованием.

Используйте символ ^, следующий сразу после открывающей скобки {.

Наименование группы задается в кавычках " сразу после символа группы ^.

```
@startsalt
{^"My group box"
    Login | "MyName"
    Password | "****"
    [Cancel] | [ OK ]
}
@endsalt
```

My group box	
Login	<input type="text" value="MyName"/>
Password	<input type="password" value="****"/>
<input type="button" value="Cancel"/>	<input type="button" value="OK"/>

## 14.4 Использование разделителя

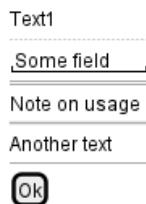
Вы можете использовать несколько горизонтальных линий как разделитель.

```
@startsalt
{
    Text1
    ..
    "Some field"
    ==
    Note on usage
    ~~
    Another text
    --
    [Ok]
```



```
}
```

```
@endsalt
```



## 14.5 Древовидный виджет

Чтобы создать дерево, вам нужно начать с {T и использовать + чтобы определять иерархию.

```
@startsalt
{
{T
+ World
++ America
+++ Canada
+++ USA
++++ New York
++++ Boston
+++ Mexico
++ Europe
+++ Italy
+++ Germany
++++ Berlin
++ Africa
}
}
@endsalt
```



## 14.6 Таблица дерева иерархии

Возможно придание таблицам древовидной (иерархической) структуры.

```
@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

```

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

Таблица может не иметь границ, как в примере выше, либо иметь только вертикальные (T!), только горизонтальные (T-), внешние границы (T+) или все границы (T#). Используйте указанные параметры сразу после открывающей скобки {.

```

@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

```



with T!		
Region	Population	Age
World	7.13 billion	30
America	964 million	30

with T-		
Region	Population	Age
World	7.13 billion	30
America	964 million	30

with T+		
Region	Population	Age
World	7.13 billion	30
America	964 million	30

with T#		
Region	Population	Age
World	7.13 billion	30
America	964 million	30

[Ref. QA-1265]

## 14.7 Окружающие скобки

Вы можете задать подэлементы, открывая новую скобку.

```
@startsalt
{
Name      | "
Modifiers: | { (X) public | () default | () private | () protected
           | [] abstract | [] final   | [] static }
Superclass: | { "java.lang.Object" | [Browse...] }
}
@endsalt
```

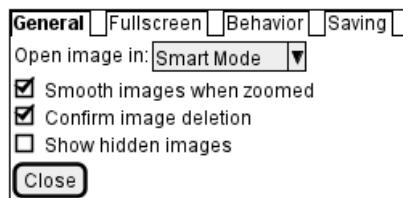
Name	<input type="text"/>
Modifiers:	<input checked="" type="radio"/> public <input type="radio"/> default <input type="radio"/> private <input type="radio"/> protected <input type="checkbox"/> abstract <input type="checkbox"/> final <input type="checkbox"/> static
Superclass:	<input type="text" value="java.lang.Object"/> <input type="button" value="Browse..."/>

## 14.8 Добавление вкладок

Вы можете добавить вкладки, используя нотацию {/. Заметьте, что вы можете использовать HTML код для выделения текста жирным.

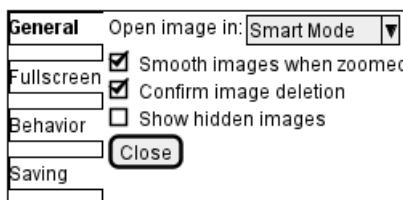
```
@startsalt
{+
{/ <b>General | Fullscreen | Behavior | Saving >
{
{ Open image in: | ^Smart Mode^ }
[X] Smooth images when zoomed
[X] Confirm image deletion
[ ] Show hidden images
}
[Close]
}
@endsalt
```





Вкладки также могут быть вертикально ориентированы:

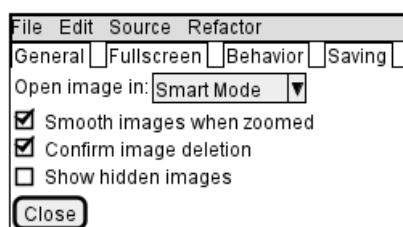
```
@startsalt
{+
{/ <b>General
Fullscreen
Behavior
Saving } |
{
{ Open image in: | ^Smart Mode^ }
[X] Smooth images when zoomed
[X] Confirm image deletion
[ ] Show hidden images
[Close]
}
}
@endsalt
```



## 14.9 Использование меню

Вы можете добавить меню используя нотацию {\*}.

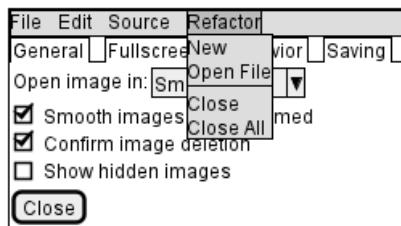
```
@startsalt
{+
{* File | Edit | Source | Refactor }
{/ General | Fullscreen | Behavior | Saving }
{
{ Open image in: | ^Smart Mode^ }
[X] Smooth images when zoomed
[X] Confirm image deletion
[ ] Show hidden images
}
[Close]
}
@endsalt
```



Также можно открыть меню:



```
@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
```



## 14.10 Продвинутая таблица

Вы можете использовать две специальные нотации для таблиц:

- \* чтобы показать что ячейка должна быть объединена с левой
- . чтобы обозначить пустую ячейку

```
@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	*

## 14.11 Полосы прокрутки

Используйте параметр S, следующий сразу после открывающей скобки {, для добавления вертикальных (S|), горизонтальных (S-) или всех (S) полос прокрутки.

```
@startsalt
{S
Message
.
.
.
}
@endsalt
```





```
@startsalt
```

```
{SI
```

```
Message
```

```
.
```

```
.
```

```
.
```

```
.
```

```
}
```

```
@endsalt
```



```
@startsalt
```

```
{S-
```

```
Message
```

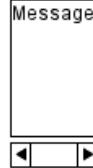
```
.
```

```
.
```

```
.
```

```
.
```

```
@endsalt
```



## 14.12 Цвет элементов

Изменяйте цвет текста в виджетах по аналогии с другими диаграммами.

Для этого поставьте код `<color: _ >` перед текстом виджета.

```
@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 dropdown^
^<color:#9a9a9a>This is a disabled dropdown^
^<color:red>This is a red dropdown^
```

```
}
```

```
@endsalt
```





[Ref. QA-12177]

## 14.13 Спрайты

Используя << и >> вы можете определить псевдо-графическое изображение (спрайт) и задать его имя, с помощью которого переиспользовать его в дальнейшем.

Спрайт представляет собой текстовое поле рамером 10 строк на 12 колонок, состоящее их пустых пикселей, задаваемых точкой (.), и заполненных пикселей, задаваемых символом X.

```
@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
.....
.XXXX. .....
.X...X.....
.XXXXXXXXXXX.
.X.....X.
.X.....X.
.X.....X.
.X.....X.
.XXXXXXXX.
.....
>>|<color:blue>other folder|<<folder>>
^Dropelist^
}
@endsalt
```



[Ref. QA-5849]

## 14.14 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	bell	cloud	excerpt	justify-right	musical-note	star
Credit to	bluetooth	cloudy	expand-down	key	paperclick	sun
https://useiconic.com/open	bold	code	expand-left	laptop	pencil	tablet
+ bold	bolt	cog	expand-right	layers	people	tag
- account-login	book	collapse-down	expand-up	lightbulb	person	tags
- account-logout	bookmark	collapse-left	external-link	link-broken	phone	target
- action-redo	box	collapse-right	eye	link-intact	pie-chart	task
- action-undo	briefcase	collapse-up	eyedropper	list-rich	pin	terminal
- align-center	british-pound	command	file	list	play-circle	text
- align-left	browser	comment-square	fire	location	plus	thumb-down
- align-right	brush	compass	flag	lock-locked	power-standby	thumb-up
aperture	bug	contrast	flash	lock-unlocked	print	timer
arrow-bottom	bullhorn	copywriting	folder	loop-circular	project	transfer
arrow-circle-bottom	calculator	credit-card	fork	loop-square	pulse	trash
arrow-circle-left	calendar	crop	fullscreen-enter	loop	puzzle-piece	underline
arrow-circle-right	camera-slr	dashboard	fullscreen-exit	magnifying-glass	question-mark	vertical-align-bottom
arrow-circle-top	caret-bottom	data-transfer-download	globe	map-marker	rain	vertical-align-center
arrow-left	caret-left	data-transfer-upload	graph	map	random	vertical-align-top
arrow-right	caret-right	delete	grid-four-up	media-pause	reload	video
arrow-thick-bottom	caret-top	dial	grid-three-up	media-play	resize-both	volume-high
arrow-thick-left	cart	document	grid-two-up	media-record	resize-height	volume-low
arrow-thick-right	chat	dollar	hard-drive	media-skip-backward	resize-width	volume-off
arrow-thick-top	check	double-quote-sans-left	header	media-skip-forward	rss-alt	warning
arrow-top	chevron-bottom	double-quote-sans-right	headphones	media-step-backward	rss	wifi
audio-spectrum	chevron-left	double-quote-serif-left	heart	media-step-forward	script	wrench
audio	chevron-right	double-quote-serif-right	home	media-stop	share-boxed	x
badge	chevron-top	droplet	image	medical-cross	share	yen
ban	circle-check	eject	inbox	menu	shield	zoom-in
bar-chart	circle-x	elevator	infinity	microphone	signal	zoom-out
basket	clipboard	ellipses	info	minus	signpost	
battery-empty	clock	envelope-closed	italic	monitor	sort-ascending	
battery-full	cloud-download	envelope-open	justify-center	moon	sort-descending	
beaker	cloud-upload	euro	justify-left	move	spreadsheet	

## 14.15 Include Salt "on activity diagram"

You can read the following explanation.

```
@startuml
(*) --> "
{{ salt
{+
<b>an example
choose one option
()one
()two
[ok]
}
}}
" as choose
```

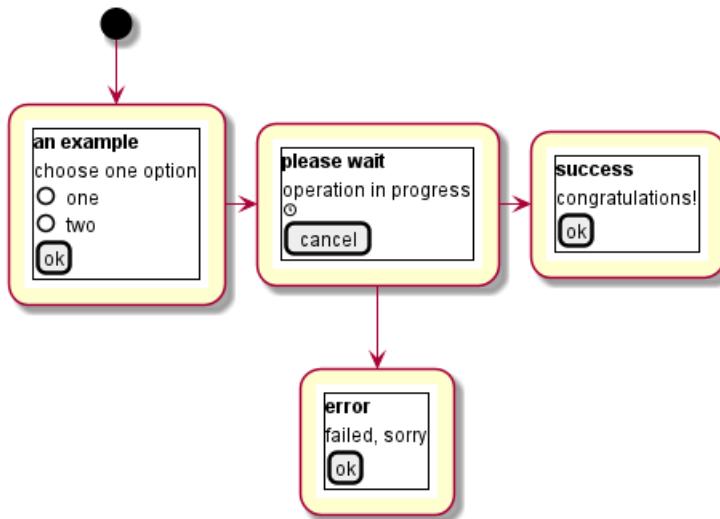


```

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

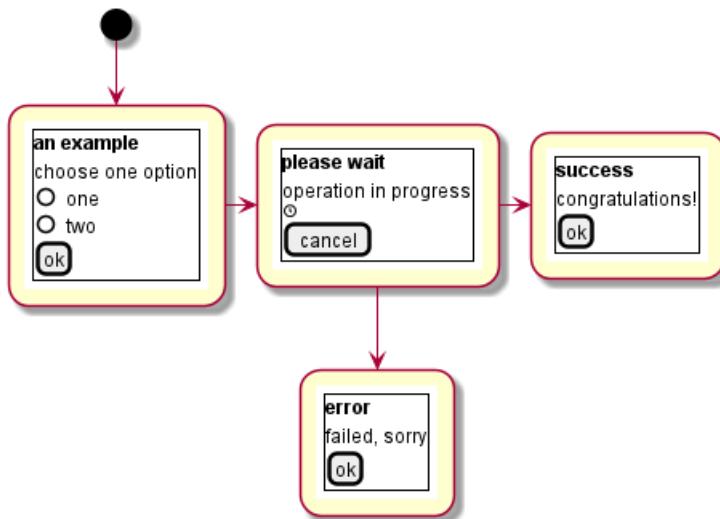
!procedure _wait()
{+
<b>please wait
operation in progress
<&clock>
[cancel]
}
!endprocedure

!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
```



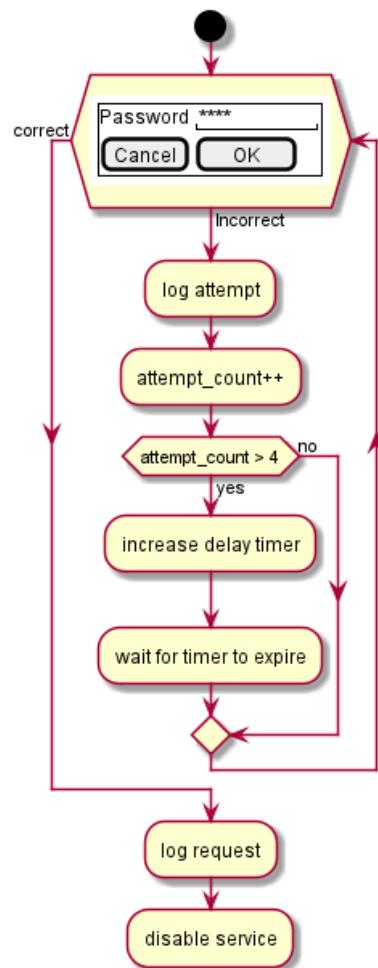


## 14.16 Include salt "on while condition of activity diagram"

You can include salt on while condition of activity diagram.

```
@startuml
start
while (\n{\nsalt\n{+\nPassword | "****" "\n[Cancel] | [ OK ]}}\n} 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]



## 15 Archimate Diagram

This is only a proposal and subject to change.

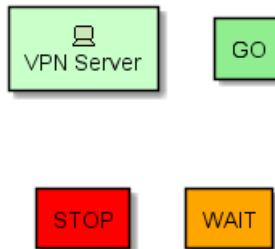
You are very welcome to create a new discussion on this future syntax. Your feedbacks, ideas and suggestions help us to find the right solution.

### 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.

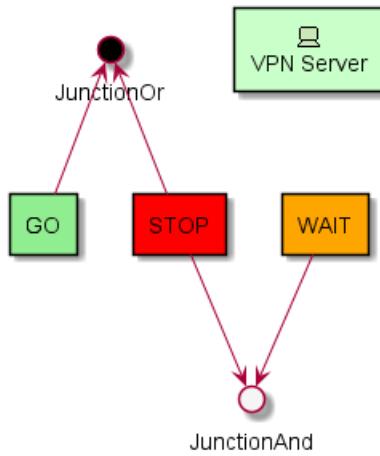
```
@startuml
!define Junction_Or circle #black
!define Junction_And circle #whitesmoke

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
  
```



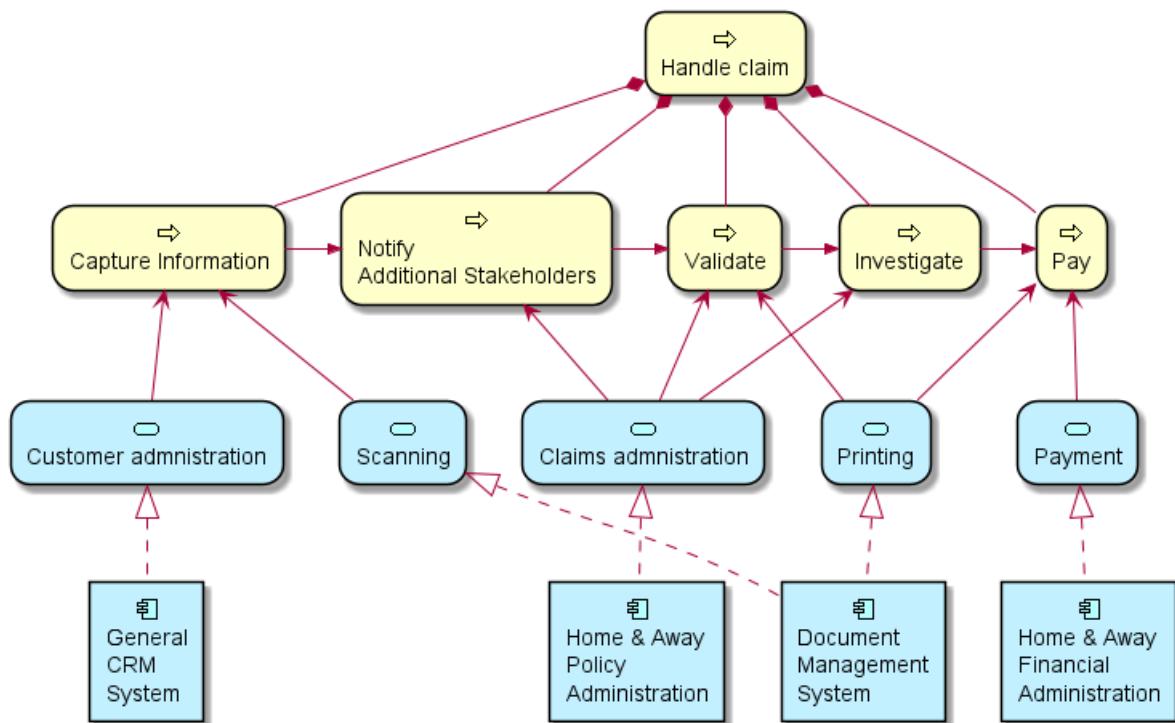
```

rectangle "Document\Management\System" as DMS <<$aComponent>> #Application
rectangle "General\CRM\System" as CRM <<$aComponent>> #Application
rectangle "Home & Away\Policy\Administration" as HAPA <<$aComponent>> #Application
rectangle "Home & Away\Financial\Administration" as HFPA <<$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

```



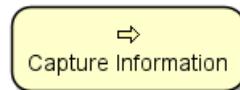
Example from the "Archisurance case study" (OpenGroup).
See
⇒ :business process
□ : application service
■ : application component

## 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
```

List Current Sprites	business-object	interface-symmetric	service
Credit to http://www.archimatetool.com	business-process	interface	serving
archimate :	business-product	junction-and	specialisation
	business-representation	junction-or	specialization
	business-role	junction	stakeholder-filled
	business-service	location	strategy-capability
	business-value	meaning	strategy-course-of-action
	collaboration	motivation-assessment	strategy-resource
	communication-path	motivation-constraint	strategy-value-stream
	component	motivation-driver	system-software
	composition	motivation-goal	technology-artifact
	constraint-filled	motivation-meaning	technology-collaboration
	constraint	motivation-outcome	technology-communication-network
	contract	motivation-principle	technology-communication-path
	deliverable-filled	motivation-requirement	technology-device
	deliverable	motivation-stakeholder	technology-event
	device	motivation-value	technology-function
	driver-filled	network	technology-infra-interface
	driver	node	technology-infra-service
	event	object	technology-interaction
	flow	physical-distribution-network	technology-interface
	function	physical-equipment	technology-network
	gap-filled	physical-facility	technology-node
	gap	physical-material	technology-path
	goal-filled	plateau	technology-process
	goal	principle-filled	technology-service
	implementation-deliverable	principle	technology-system-software
	implementation-event	process	triggering
	implementation-gap	product	used-by
	implementation-plateau	realisation	value
	implementation-workpackage	representation	workpackage-filled
	influence	requirement-filled	
	interaction	requirement	
	interface-required	role	

## 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 (nameOfTheElement "description")

For example:

- To define a *Stakeholder* element, which is part of Motivation category, the syntax will be Motivation\_Stakeholder (Stakeholder "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(fromElement, 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")
```

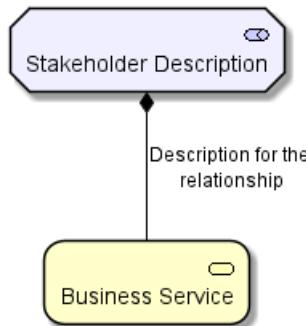
```
@startuml
!include <archimate/Archimate>
Motivation_Stakeholder(StakeholderElement, "Stakeholder Description")
```



```

Business_Service(BService, "Business Service")
Rel_Composition(StakeholderElement, BService, "Description for the relationship")
@enduml

```

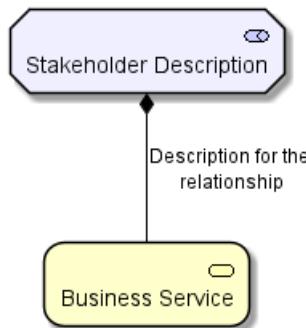


- Unordered List Item To orient the two elements in top - down position, the syntax will be

```

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

```



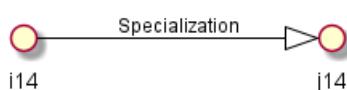
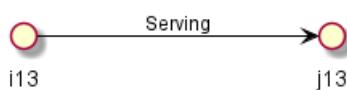
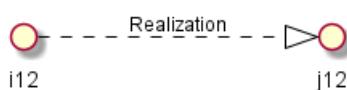
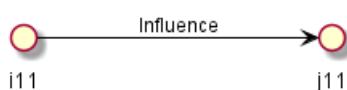
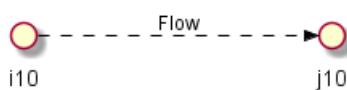
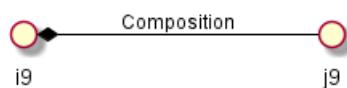
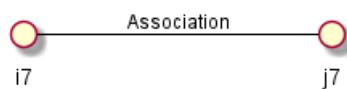
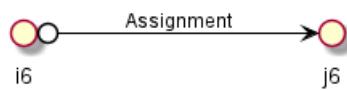
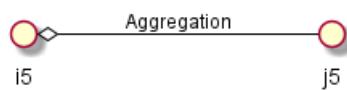
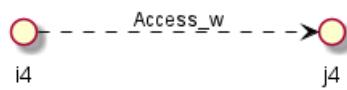
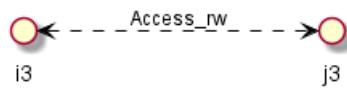
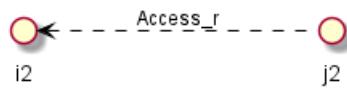
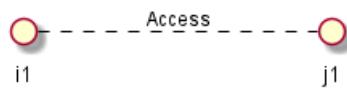
#### 15.6.4 Appendix: Examples of all Archimate RelationTypes

```

@startuml
left to right direction
!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

```





## 16 Gantt Diagram

The Gantt is described in *natural* language, using very simple sentences (subject-verb-complement).

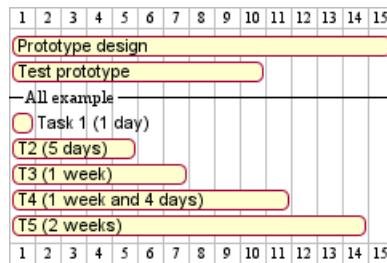
### 16.1 Declaring tasks

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
```

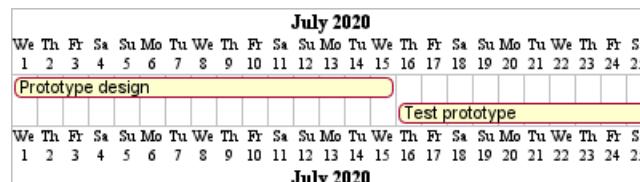


#### 16.1.2 Start

Their beginning are defined using the start verb:

```
@startuml
[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  
 @enduml



#### 16.1.3 End

Their ending are defined using the end verb:

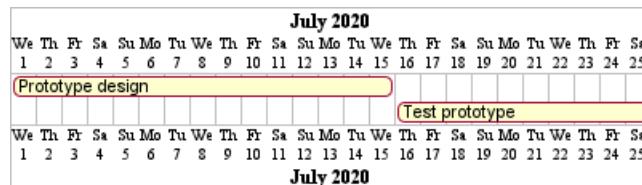
```
@startuml
[Prototype design] lasts 15 days
[Test prototype] lasts 10 days
```

Project starts 2020-07-01  
 [Prototype design] ends 2020-07-15



[Test prototype] ends 2020-07-25

@enduml



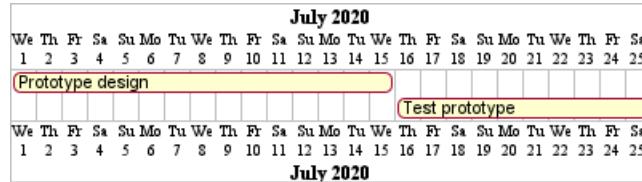
#### 16.1.4 Start/End

It is possible to define both absolutely, by specifying dates:

@startuml

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

@enduml



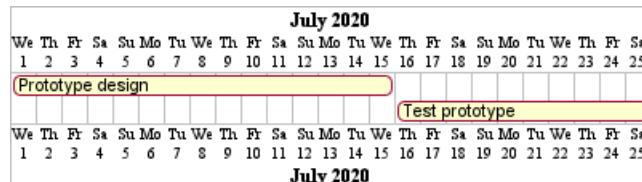
## 16.2 One-line declaration (with the and conjunction)

It is possible to combine declaration on one line with the and conjunction.

@startuml

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

@enduml



## 16.3 Adding constraints

It is possible to add constraints between tasks.

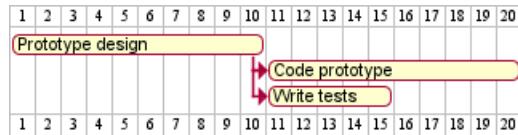
@startgantt

[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

You can set the completion status of a task.

```
@startgantt
[foo] lasts 21 days
[foo] is 40% completed
[bar] lasts 30 days and is 10% complete
@endgantt
```



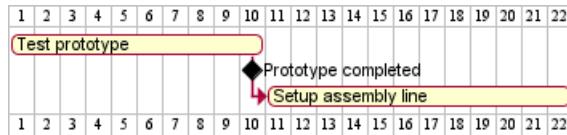
## 16.7 Milestone

You can define Milestones using the happen verb.



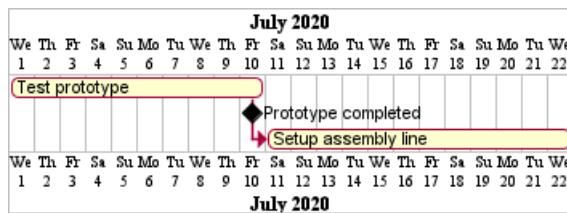
### 16.7.1 Relative milestone (use of constraints)

```
@startgantt
[Test prototype] lasts 10 days
[Prototype completed] happens at [Test prototype]'s end
[Setup assembly line] lasts 12 days
[Setup assembly line] starts at [Test prototype]'s end
@endgantt
```



### 16.7.2 Absolute milestone (use of fixed date)

```
@startgantt
Project starts 2020-07-01
[Test prototype] lasts 10 days
[Prototype completed] happens 2020-07-10
[Setup assembly line] lasts 12 days
[Setup assembly line] starts at [Test prototype]'s end
@endgantt
```



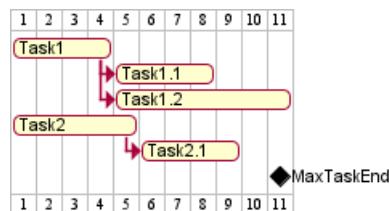
### 16.7.3 Milestone of maximum end of tasks

```
@startgantt
[Task1] lasts 4 days
then [Task1.1] lasts 4 days
[Task1.2] starts at [Task1]'s end and lasts 7 days

[Task2] lasts 5 days
then [Task2.1] lasts 4 days

[MaxTaskEnd] happens at [Task1.1]'s end
[MaxTaskEnd] happens at [Task1.2]'s end
[MaxTaskEnd] happens at [Task2.1]'s end

@endgantt
```



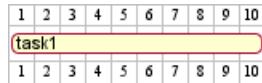
[Ref. QA-10764]

## 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



(See QA-11272, QA-9041 and QA-10948)

### 16.11.1 Daily (by default)

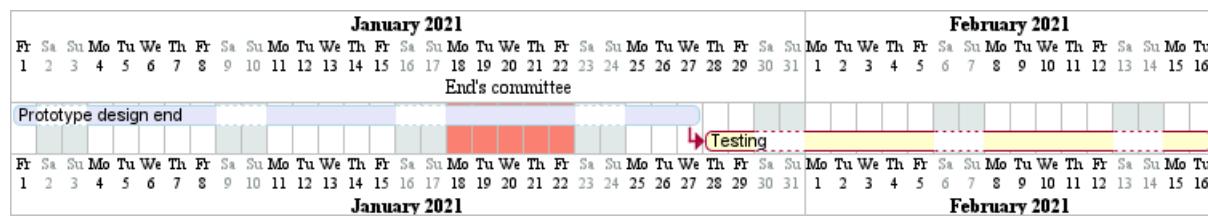
```
@startuml
saturday are closed
sunday are closed
```

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

```
@enduml
```



### 16.11.2 Weekly

```
@startuml
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

```
@enduml
```



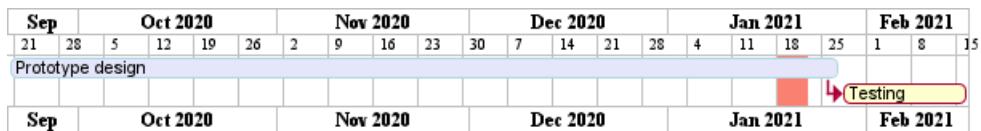
```
@startgantt
printscale weekly
Project starts the 20th of september 2020
[Prototype design] as [TASK1] lasts 130 days
[TASK1] is colored in Lavender/LightBlue
[Testing] lasts 20 days
[TASK1]->[Testing]
```

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]
```

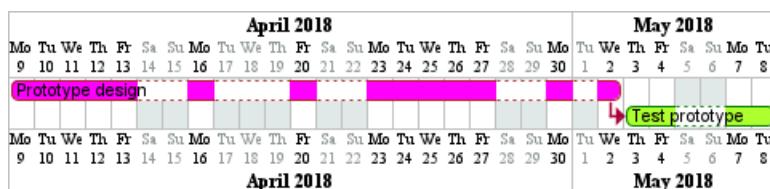
2021-01-18 to 2021-01-22 are named [End's committee]  
 2021-01-18 to 2021-01-22 are colored in salmon  
 @endgantt



## 16.12 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
```

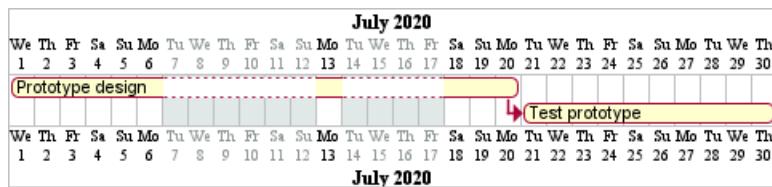


Then it is possible to open some closed day.

```
@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

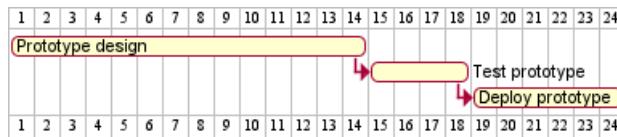




## 16.13 Simplified task succession

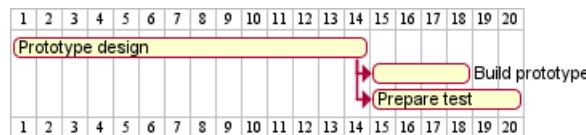
It's possible to use the then keyword to denote consecutive tasks.

```
@startgantt
[Prototype design] lasts 14 days
then [Test prototype] lasts 4 days
then [Deploy prototype] lasts 6 days
@endgantt
```



You can also use arrow ->

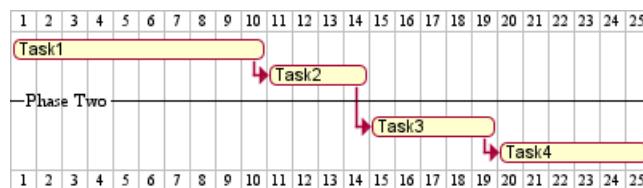
```
@startgantt
[Prototype design] lasts 14 days
[Build prototype] lasts 4 days
[Prepare test] lasts 6 days
[Prototype design] -> [Build prototype]
[Prototype design] -> [Prepare test]
@endgantt
```



## 16.14 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
```



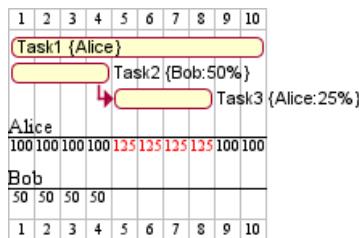
## 16.15 Working with resources

You can affect tasks on resources using the on keyword and brackets for resource name.

```
@startgantt
[Task1] on {Alice} lasts 10 days
```

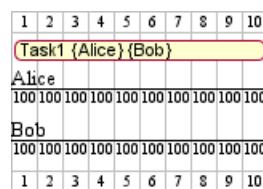


```
[Task2] on {Bob:50%} lasts 2 days
then [Task3] on {Alice:25%} lasts 1 days
@endgantt
```



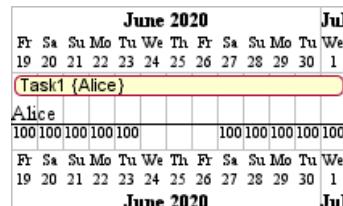
Multiple resources can be assigned to a task:

```
@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
```

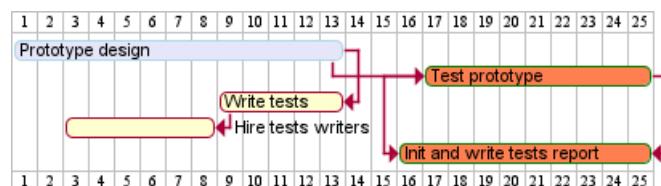


## 16.16 Complex example

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 design]
[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 prototype]
@endgantt
```



## 16.17 Comments

As is mentioned on Common Commands page: `blockquote` Everything that starts with simple quote ' is a comment.

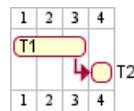
You can also put comments on several lines using '/' to start and '/' to end. `blockquote` (*i.e.: the first character (except space character) of a comment line must be a simple quote '*)

```
@startgantt
' This is a comment

[T1] lasts 3 days

/' this comment
is on several lines '/

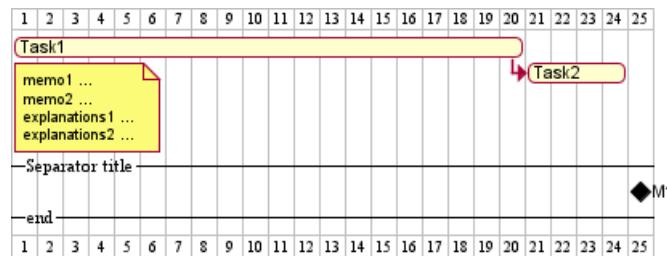
[T2] starts at [T1]'s end and lasts 1 day
@endgantt
```



## 16.18 Using style

### 16.18.1 Without style (by default)

```
@startuml
[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 --
@enduml
```



### 16.18.2 With style

You can use style to change rendering of elements.

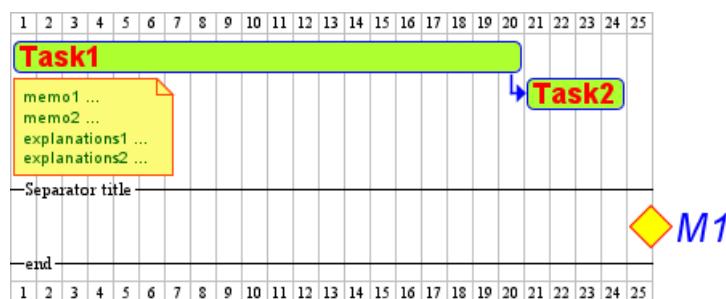
```
@startuml
<style>
ganttDiagram {
task {
FontName Helvetica
FontColor red
FontSize 18
}}
```



```

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 --
@enduml

```



[Ref. QA-10835, QA-12045, QA-11877 and PR-438]

**TODO:** TODO Awaiting style for Separator and all style for Arrow (thickness...)

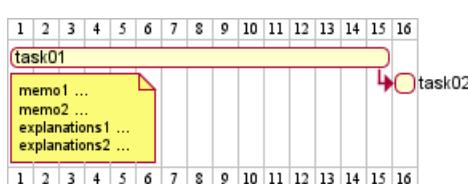


## 16.19 Add notes

```
@startgantt
[task01] lasts 15 days
note bottom
  memo1 ...
  memo2 ...
  explanations1 ...
  explanations2 ...
end note
```

[task01] -> [task02]

```
@endgantt
```

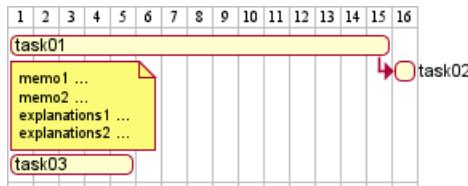


Example with overlap.

```
@startgantt
[task01] lasts 15 days
note bottom
  memo1 ...
  memo2 ...
  explanations1 ...
  explanations2 ...
end note
```

[task01] -> [task02]
[task03] lasts 5 days

```
@endgantt
```



```
@startgantt
```

-- test01 --

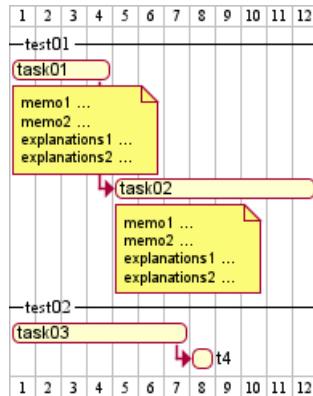
```
[task01] lasts 4 days
note bottom
'note left
memo1 ...
memo2 ...
explanations1 ...
explanations2 ...
end note
```

```
[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
```

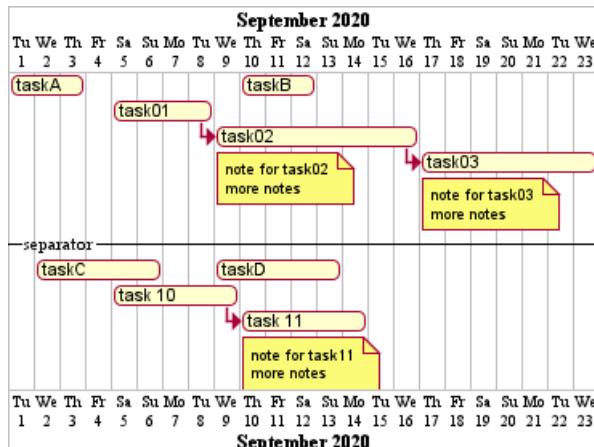
-- separator --

```
[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
```

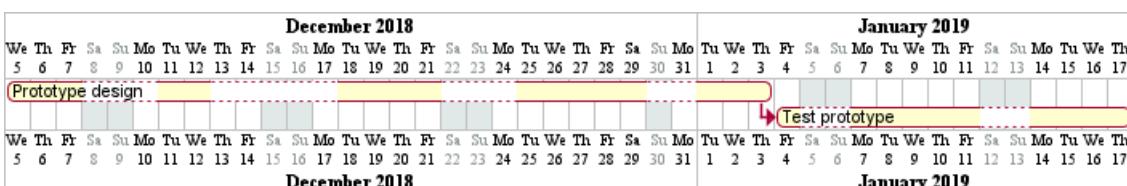


more notes  
end note  
@endgantt



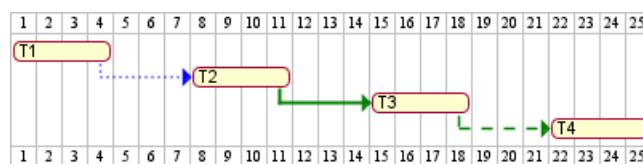
## 16.20 Pause tasks

```
@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
```



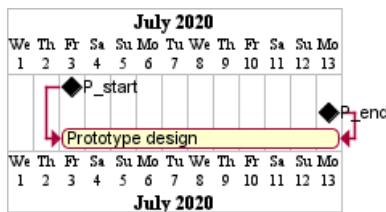
## 16.21 Change link colors

```
@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
```



```
@startuml  
Links are colored in blue  
[Prototype design] lasts 14 days  
[Build prototype] lasts 4 days  
[Prepare test] lasts 6 days
```





## 16.25 Grammar and verbal form

Verbal form	Example
[T] starts	
[M] happens	

## 16.26 Add title, header, footer, caption or legend on gantt diagram

```
@startuml
```

```
header some header
```

```
footer some footer
```

```
title My title
```

```
[Prototype design] lasts 13 days
```

```
legend
```

```
The legend
```

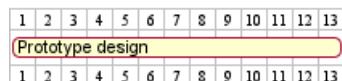
```
end legend
```

```
caption This is caption
```

```
@enduml
```

some header

**My title**



The legend

This is caption

some footer

(See also: *Common commands*)

## 16.27 Removing Foot Boxes

You can use the `hide_footbox` keyword to remove the foot boxes of the gantt diagram (as for sequence diagram).

Examples on:

- daily scale (*without project start*)

```
@startgantt
```

```
hide footbox
```

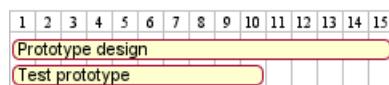
```
title Foot Box removed
```

```
[Prototype design] lasts 15 days
```

```
[Test prototype] lasts 10 days
```

```
@endgantt
```



**Foot Box removed**

- 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

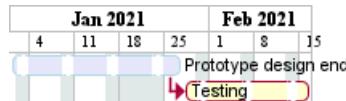
```
@startgantt
```

```
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





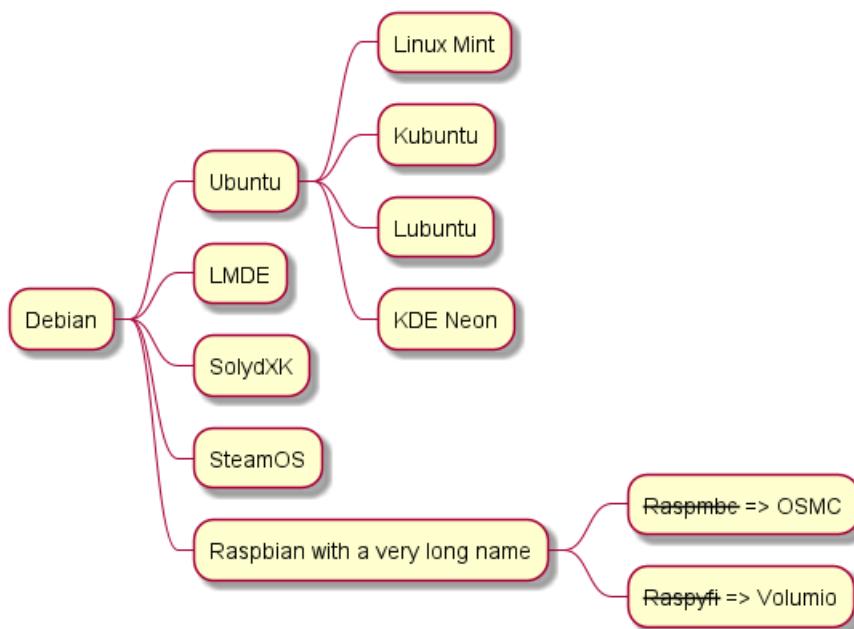
## 17 Ментальные карты

Диаграммы ментальных карт всё ещё в статусе бета-версии: синтаксис может измениться без оповещений.

### 17.1 Синтаксис OrgMode

Этот синтаксис совместим с OrgMode

```
@startmindmap
* Debian
** Ubuntu
*** Linux Mint
*** Kubuntu
*** Lubuntu
*** KDE Neon
** LMDE
** SolydXK
** SteamOS
** Raspbian with a very long name
*** <s>Raspmbc</s> => OSMC
*** <s>Raspyfi</s> => Volumio
@endmindmap
```

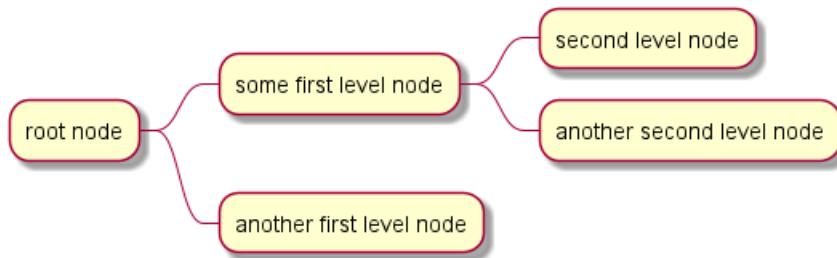


### 17.2 Markdown синтаксис

Этот синтаксис совместим с Markdown

```
@startmindmap
* root node
* some first level node
* second level node
* another second level node
* another first level node
@endmindmap
```

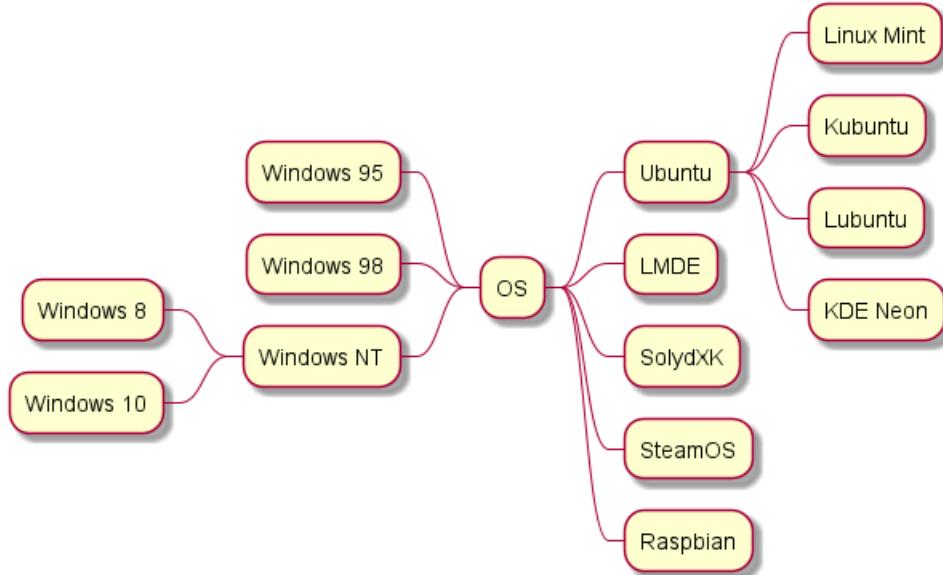




### 17.3 Арифметическая нотация

Вы можете использовать следующую нотацию для выбора направления ветвления.

```
@startmindmap
+ OS
++ Ubuntu
+++ Linux Mint
+++ Kubuntu
+++ Lubuntu
+++ KDE Neon
++ LMDE
++ SolydXK
++ SteamOS
++ Raspbian
-- Windows 95
-- Windows 98
-- Windows NT
--- Windows 8
--- Windows 10
@endmindmap
```



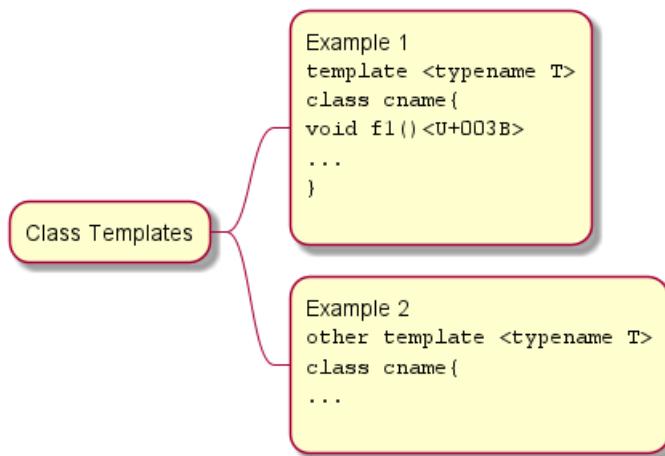
### 17.4 Multilines

Вы можете использовать символы : и ; для того, чтобы создавать многострочные блоки.

```
@startmindmap
* Class Templates
```



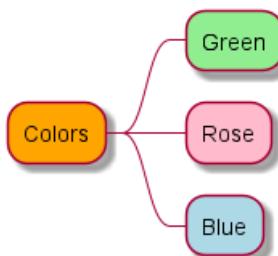
```
**:Example 1
<code>
template <typename T>
class cname{
void f1()<U+003B>
...
}
</code>
;
**:Example 2
<code>
other template <typename T>
class cname{
...
</code>
;
@endmindmap
```



## 17.5 Цвета

Можно задавать цвет узлов диаграммы.

```
@startmindmap
*[#Orange] Colors
**[#lightgreen] Green
**[#FFBBCC] Rose
**[#lightblue] Blue
@endmindmap
```

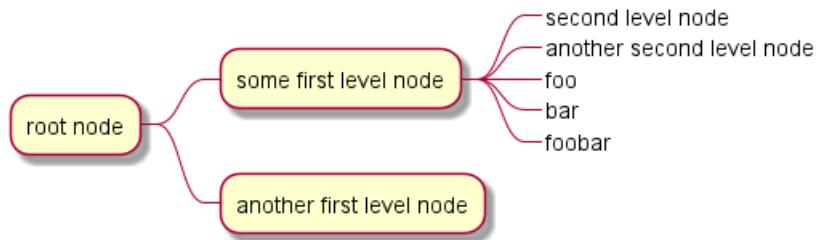


## 17.6 Убиение рамки

Вы можете убрать рамку вокруг блока используя символ подчёркивания.



```
@startmindmap
* root node
** some first level node
***_ second level node
***_ another second level node
***_ foo
***_ bar
***_ foobar
** another first level node
@endmindmap
```



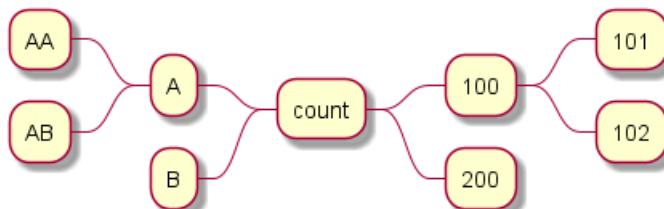
## 17.7 Изменение направления ветвления

Возможно использовать обе стороны диаграммы.

```
@startmindmap
* count
** 100
*** 101
*** 102
** 200
```

left side

```
** A
*** AA
*** AB
** B
@endmindmap
```



## 17.8 Полный пример

```
@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>Raspmbe</s> => OSMC
*** <s>Raspyfi</s> => Volumio
```

```
header
My super header
endheader

center footer My super footer

legend right
Short
legend
endlegend
@endmindmap
```

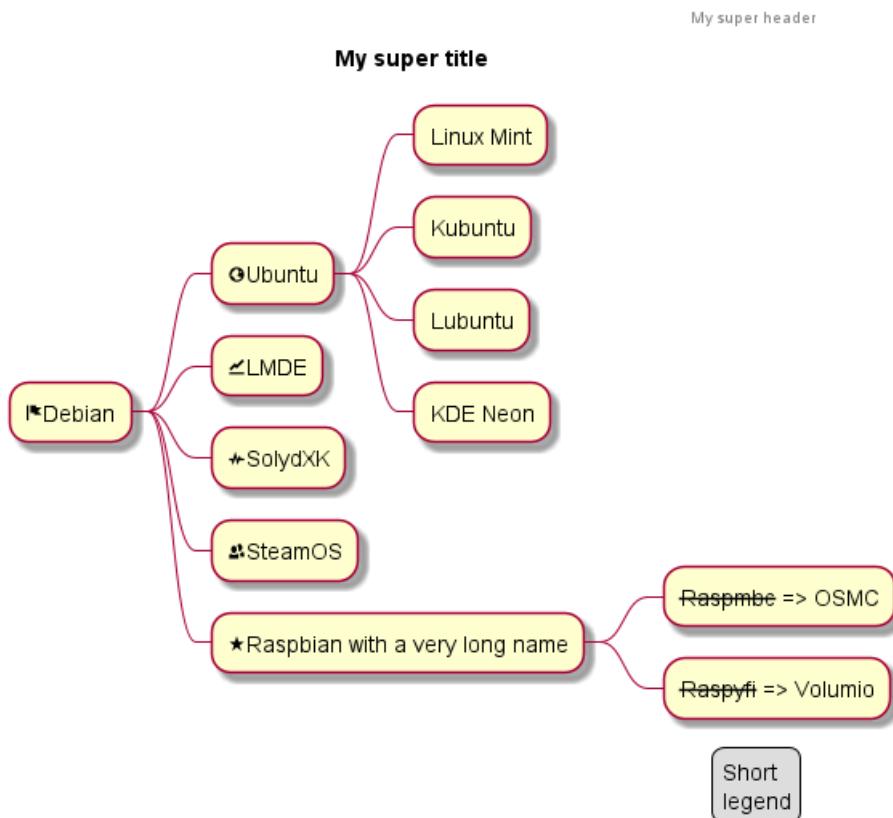


figure 1  
My super footer

## 17.9 Changing style

### 17.9.1 node, depth

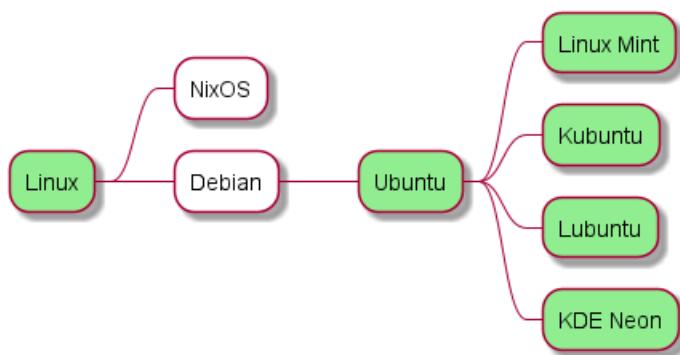
```
@startmindmap
<style>
mindmapDiagram {
    node {
```



```

        BackgroundColor lightGreen
    }
    :depth(1) {
        BackGroundColor white
    }
}
</style>
* Linux
** NixOS
** Debian
*** Ubuntu
**** Linux Mint
**** Kubuntu
**** Lubuntu
**** KDE Neon
@endmindmap

```



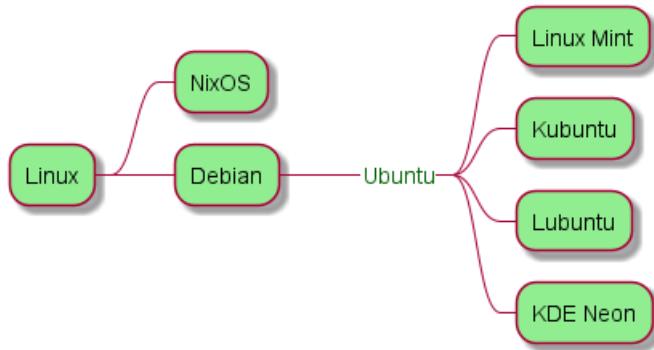
### 17.9.2 boxless

```

@startmindmap
<style>
mindmapDiagram {
    node {
        BackgroundColor lightGreen
    }
    boxless {
        FontColor darkgreen
    }
}
</style>
* Linux
** NixOS
** Debian
*** _Ubuntu
**** Linux Mint
**** Kubuntu
**** Lubuntu
**** KDE Neon
@endmindmap

```





## 17.10 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
}

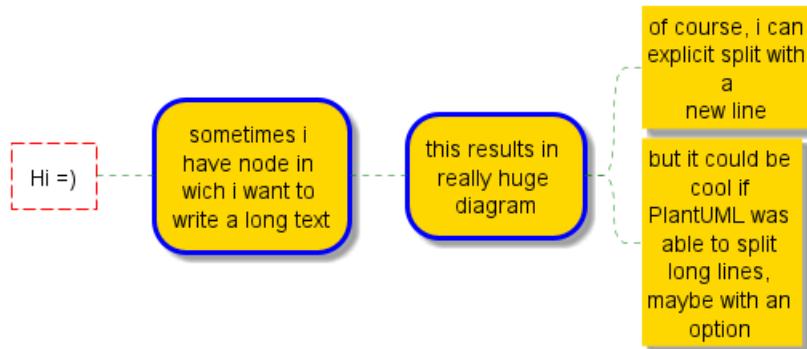
arrow {
    LineStyle 4
    LineThickness 0.5
    LineColor green
}
</style>

* Hi =)
** sometimes i have node in which i want to write a long text
*** this results in really huge diagram
**** of course, i can explicitly split with a\nnew line
  
```



\*\*\*\* but it could be cool if PlantUML was able to split long lines, maybe with an option

@endmindmap



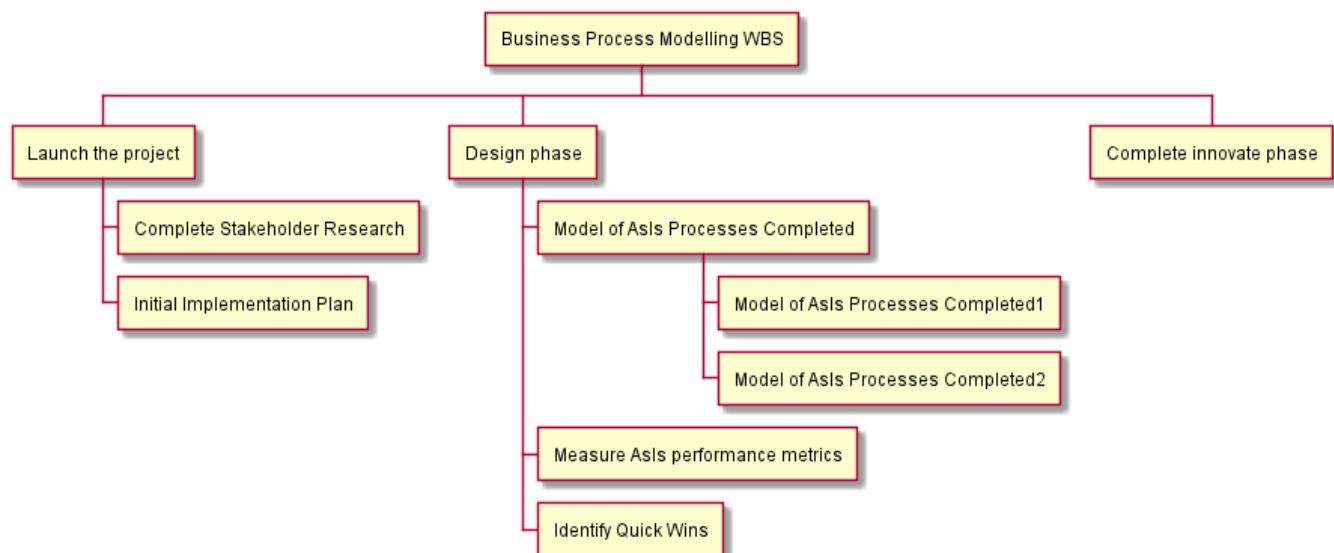
## 18 Work Breakdown Structure (WBS)

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
```

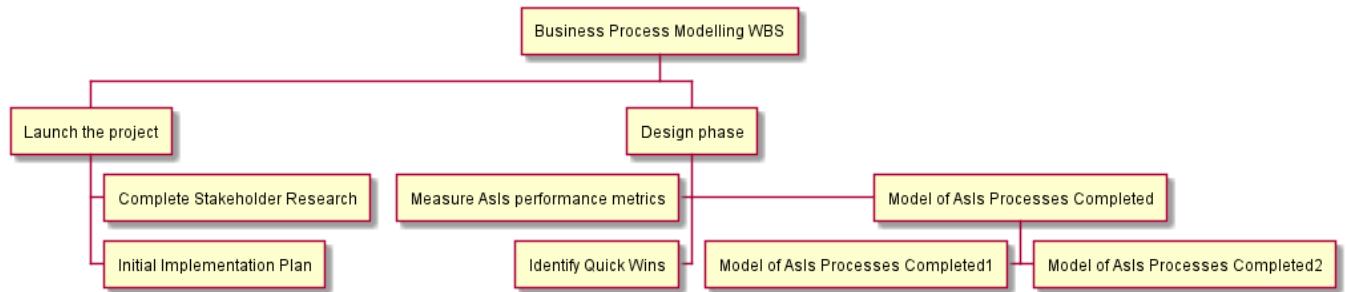


### 18.2 Change direction

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
```



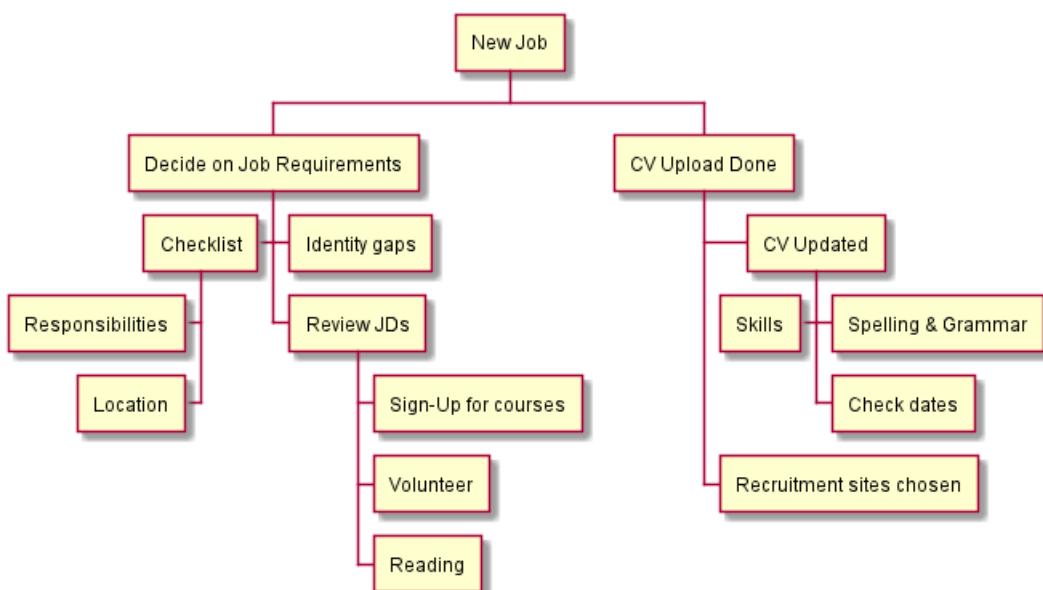


### 18.3 Arithmetic notation

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 Removing box

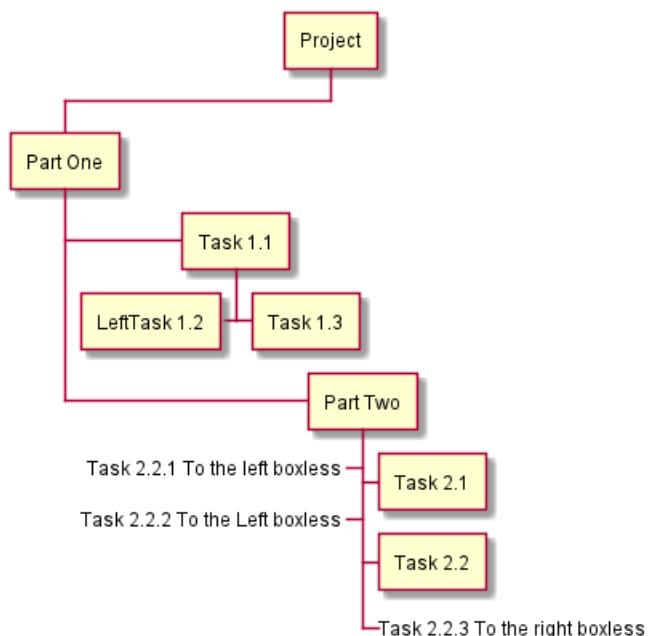
You can use underscore \_ to remove box drawing.



### 18.4.1 Boxless on Arithmetic notation

#### 18.4.2 Several boxless node

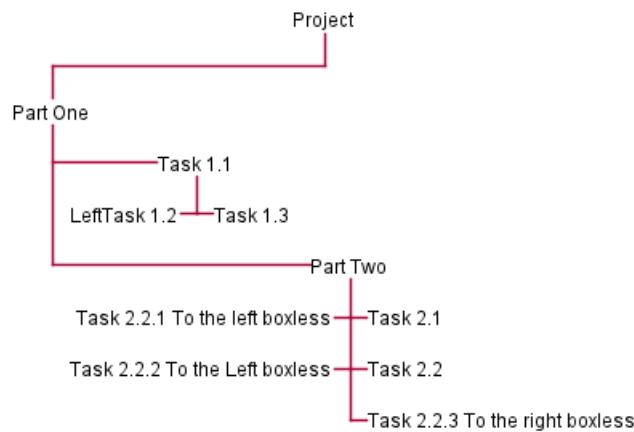
```
@startwbs
+ Project
+ Part One
+ Task 1.1
- LeftTask 1.2
+ Task 1.3
+ Part Two
+ Task 2.1
+ Task 2.2
-_ Task 2.2.1 To the left boxless
-_ Task 2.2.2 To the Left boxless
+_ Task 2.2.3 To the right boxless
@endwbs
```



#### 18.4.3 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
```

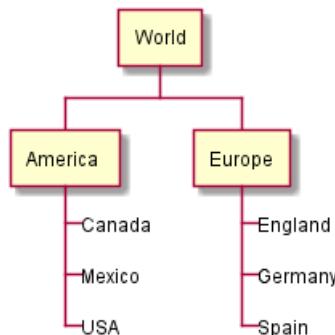




#### 18.4.4 Boxless on OrgMode syntax

#### 18.4.5 Several boxless node

```
@startwbs
* World
** America
*** _ Canada
*** _ Mexico
*** _ USA
** Europe
*** _ England
*** _ Germany
*** _ Spain
@endwbs
```

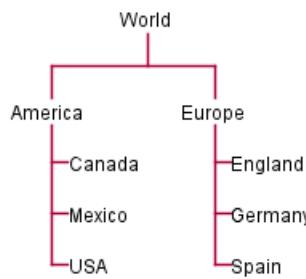


[Ref. QA-13297]

#### 18.4.6 All boxless node

```
@startwbs
*_ World
**_ America
***_ Canada
***_ Mexico
***_ USA
**_ Europe
***_ England
***_ Germany
***_ Spain
@endwbs
```





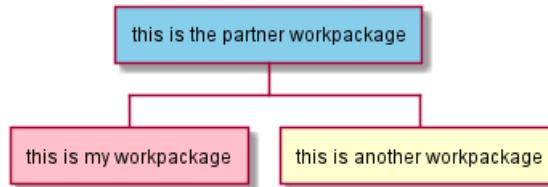
[Ref. QA-13355]

## 18.5 Colors (with inline or style color)

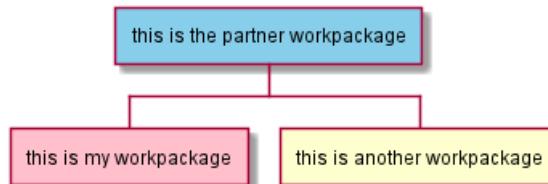
It is possible to change node color:

- 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
```



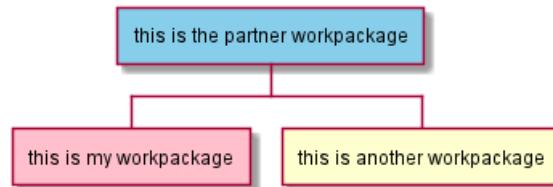
[Ref. QA-12374, only from v1.2020.20]

- with style color

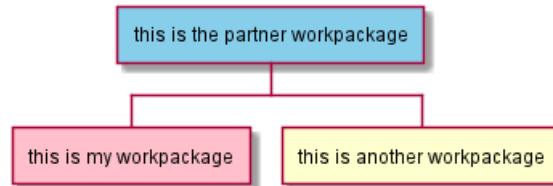
```
@startwbs
<style>
wbsDiagram {
    .pink {
        BackgroundColor pink
    }
    .your_style_name {
        BackgroundColor SkyBlue
    }
}
</style>
* this is the partner workpackage <<your_style_name>>
```



```
** 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
```



## 18.6 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) {

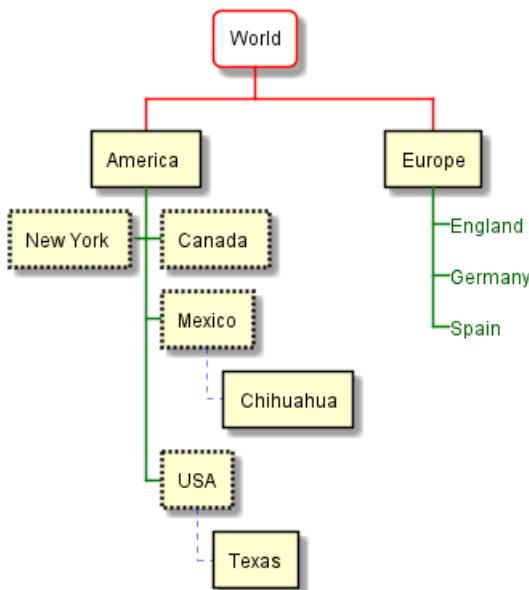
```



```

// 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

```



## 18.7 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
}

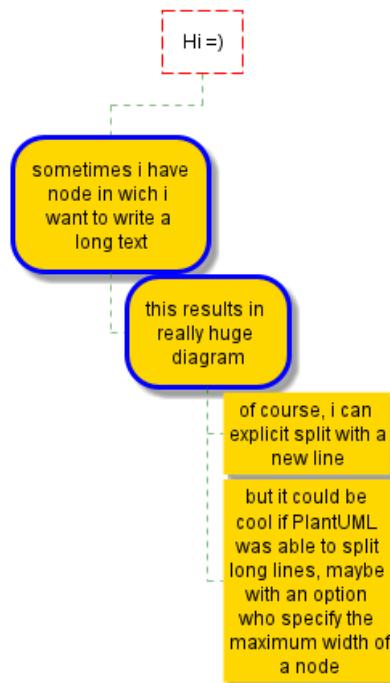
leafNode {
    LineColor gold
    RoundCorner 0
    Padding 3
}

arrow {
    LineStyle 4
    LineThickness 0.5
    LineColor green
}
</style>

* Hi =)
** sometimes i have node in which i want to write a long text
*** this results in really huge diagram
**** of course, i can explicitly split with a\nnew line
**** but it could be cool if PlantUML was able to split long lines, maybe with an option who specifies

@endwbs
```

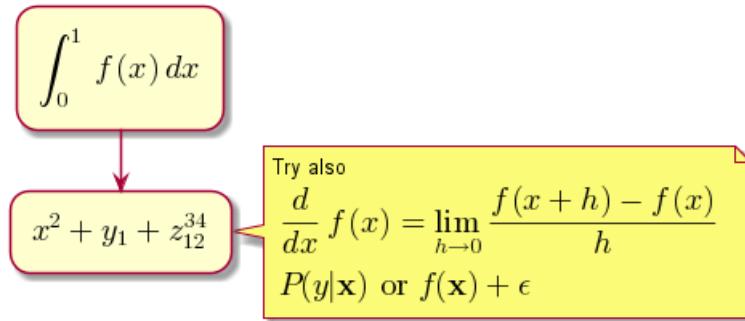




## 19 Maths

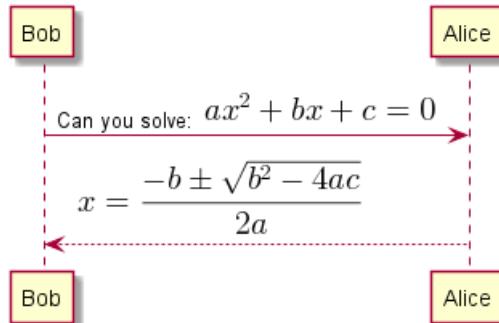
You can use AsciiMath or JLaTeXMath notation within PlantUML:

```
@startuml
:<math>\int_0^1 f(x) dx</math>;
:<math>x^2+y_1+z_{12}^{34}</math>;
note right
Try also
<math>d/dx f(x) = \lim_{h \rightarrow 0} (f(x+h) - f(x))/h</math>
<math>P(y|\mathbf{x}) \ \text{or} \ f(\mathbf{x}) + \epsilon</math>
end note
@enduml
```



or:

```
@startuml
Bob --> Alice : Can you solve: <math>ax^2+bx+c=0</math>
Alice --> Bob: <math>x = (-b \pm \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)^oo a_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.

PlantUML relies on the Java Scripting API (specifically: `new ScriptEngineManager().getEngineByName("JavaScript")`) to load a JavaScript engine and execute JavaScript code. Java 8 includes a JavaScript engine called Nashorn but it was deprecated in Java 11.

If you are using AsciiMath in Java 11 you see the following warnings:

`Warning: Nashorn engine is planned to be removed from a future JDK release`

Nashorn was removed in Java 15. Fortunately, you can use the GraalVM JavaScript Engine instead by adding the following dependencies:

```
<dependency>
    <groupId>org.graalvm.js</groupId>
    <artifactId>js</artifactId>
    <version>20.2.0</version>
</dependency>
<dependency>
    <groupId>org.graalvm.js</groupId>
    <artifactId>js-scriptengine</artifactId>
    <version>20.2.0</version>
</dependency>
```

You can even use the GraalVM JavaScript Engine in Java 11 to get rid of the warning messages.

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 Diagram

Based on the Information Engineering notation.

This is an extension to the existing Class Diagram. This extension adds:

- Additional relations for the Information Engineering notation.
- An entity alias that maps to the class diagram class.
- An additional visibility modifier \* to identify mandatory attributes.

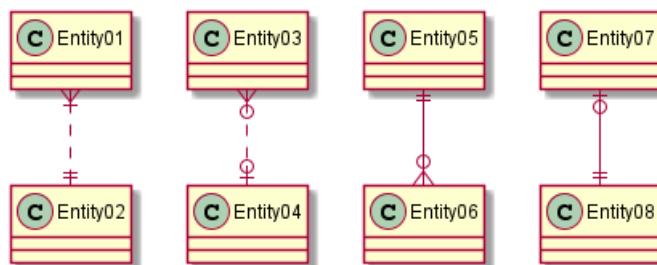
Otherwise, the syntax for drawing diagrams is the same as for class diagrams. All other features of class diagrams are also supported.

### 20.1 Information Engineering Relations

Type	Symbol
Zero or One	o--
Exactly One	--
Zero or Many	}o--
One or Many	} --

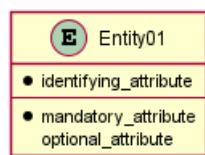
Examples:

```
@startuml
Entity01 }|..|| Entity02
Entity03 }o..o| Entity04
Entity05 ||--o{ Entity06
Entity07 |o--|| Entity08
@enduml
```



### 20.2 Entities

```
@startuml
entity Entity01 {
    * identifying_attribute
    --
    * mandatory_attribute
    optional_attribute
}
@enduml
```



Again, this is the normal class diagram syntax (aside from use of `entity` instead of `class`). Anything that you can do in a class diagram can be done here.

The \* visibility modifier can be used to identify mandatory attributes. A space can be used after the modifier character to avoid conflicts with the creole bold:



```
@startuml
entity Entity01 {
    optional attribute
    **optional bold attribute**
    * **mandatory bold attribute**
}
@enduml
```



### 20.3 Complete Example

```
@startuml

' hide the spot
hide circle

' avoid problems with angled crows feet
skinparam linetype ortho

entity "Entity01" as e01 {
    *e1_id : number <<generated>>
    --
    *name : text
    description : text
}

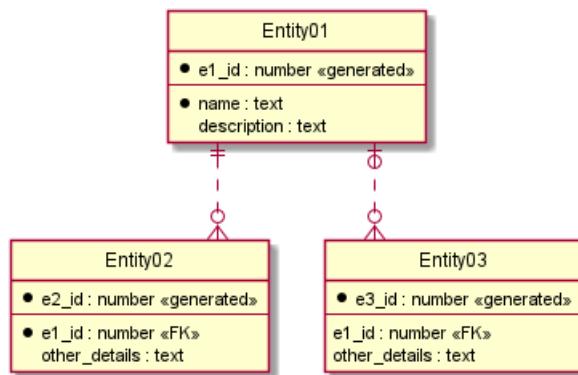
entity "Entity02" as e02 {
    *e2_id : number <<generated>>
    --
    *e1_id : number <<FK>>
    other_details : text
}

entity "Entity03" as e03 {
    *e3_id : number <<generated>>
    --
    e1_id : number <<FK>>
    other_details : text
}

e01 ||..o{ e02
e01 |o..o{ e03

@enduml
```





Currently the crows feet do not look very good when the relationship is drawn at an angle to the entity. This can be avoided by using the `linetype ortho` skinparam.



## 21 Common commands

### 21.1 Comments

Everything that starts with simple quote ' is a comment.

You can also put comments on several lines using /' to start and '/ to end.

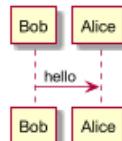
### 21.2 Zoom

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 keyword is used to put a title. You can add newline using \n in the title description.

Some skinparam settings are available to put borders on the title.

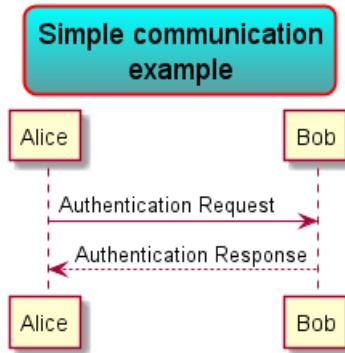
```
@startuml
skinparam titleBorderRoundCorner 15
skinparam titleBorderThickness 2
skinparam titleBorderColor red
skinparam titleBackgroundColor Aqua-CadetBlue

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
```

```

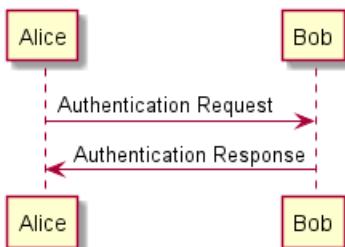
title
<u>Simple</u> communication example
on <i>several</i> lines and using <back:cadetblue>creole tags</back>
end title
  
```

```

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

```
@enduml
```

### Simple communication example on several lines and using creole tags



## 21.4 Caption

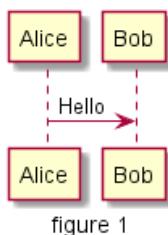
There is also a caption keyword to put a caption under the diagram.

```
@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.

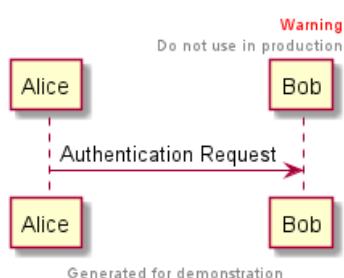
It is also possible to put some HTML into the header or footer.

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

```
header
<font color=red>Warning:</font>
Do not use in production.
endheader

center footer Generated for demonstration
```

```
@enduml
```

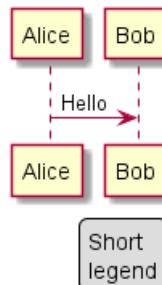


## 21.6 Legend the diagram

The `legend` and `end legend` are keywords used to put a legend.

You can optionally specify to have `left`, `right`, `top`, `bottom` or `center` alignment for the legend.

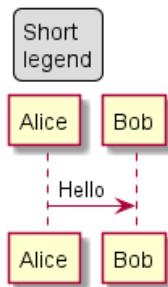
```
@startuml
Alice -> Bob : Hello
legend right
Short
legend
endlegend
@enduml
```



```
@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
```

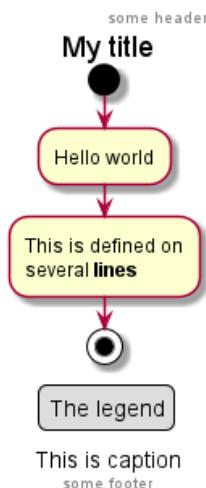
```
title My title
```

```
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

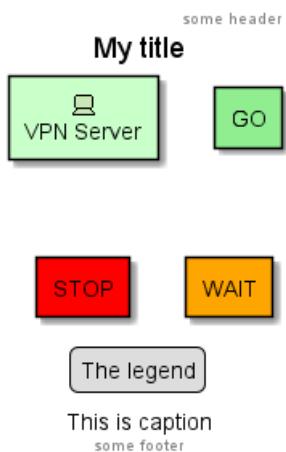
legend
The legend
end legend

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

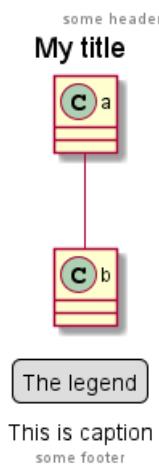
legend
The legend
end legend

a -- b

@enduml

```





#### 21.7.4 Component, Deployment, Use-Case

```
@startuml
header some header

footer some footer

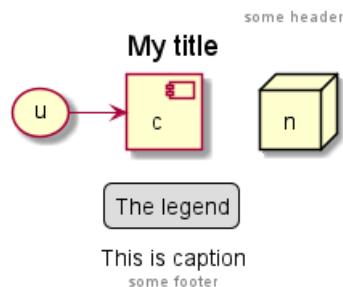
title My title

caption This is caption

legend
The legend
end legend

node n
(u) -> [c]

@enduml
```



#### 21.7.5 Gantt project planning

```
@startuml
header some header

footer some footer

title My title

caption This is caption

legend
The legend
```



```
end legend
```

```
[t] lasts 5 days
```

```
@enduml
```

some header

### My title

1	2	3	4	5
t				
1	2	3	4	5

The legend

This is caption

some footer

**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
```

some header

### My title

user
name = "Dummy"
id = 123

The legend

This is caption

some footer

#### 21.7.7 MindMap

```
@startmindmap
header some header
```

```
footer some footer
```

```
title My title
```

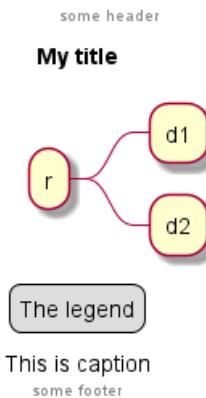


```
caption This is caption
```

```
legend
The legend
end legend
```

```
* r
** d1
** d2
```

```
@endmindmap
```



### 21.7.8 Network (nwdiag)

```
@startuml
header some header

footer some footer

title My title

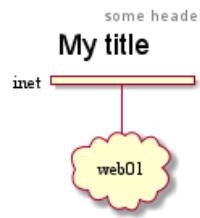
caption This is caption
```

```
legend
The legend
end legend
```

```
nwdiag {
    network inet {
        web01 [shape = cloud]
    }
}
```

```
@enduml
```





The legend

This is caption  
some footer

### 21.7.9 Sequence

```
@startuml
```

```
header some header
```

```
footer some footer
```

```
title My title
```

```
caption This is caption
```

```
legend
```

```
The legend
```

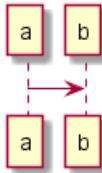
```
end legend
```

```
a->b
```

```
@enduml
```

some header

My title



The legend

This is caption

some footer

### 21.7.10 State

```
@startuml
```

```
header some header
```

```
footer some footer
```

```
title My title
```

```
caption This is caption
```

```
legend
```

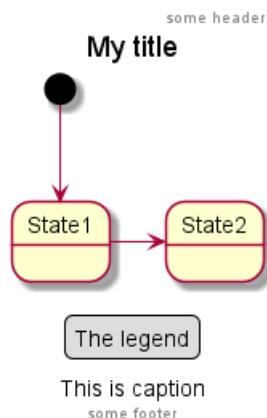
```
The legend
```

```
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

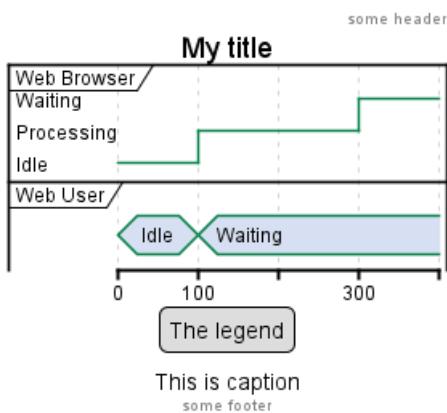
@0
WU is Idle
WB is Idle

@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

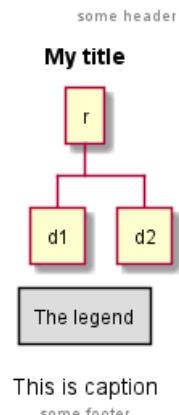
title My title

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 V1.2020.18-19*) 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
```

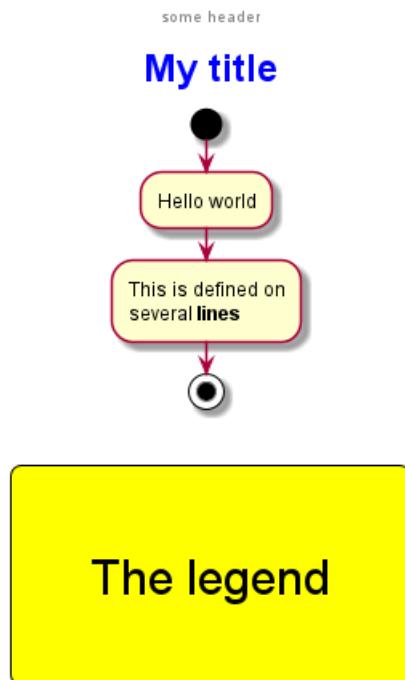


```

start
:Hello world;
:This is defined on
several **lines**;
stop

```

@enduml



## This is caption

**some footer**

### 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

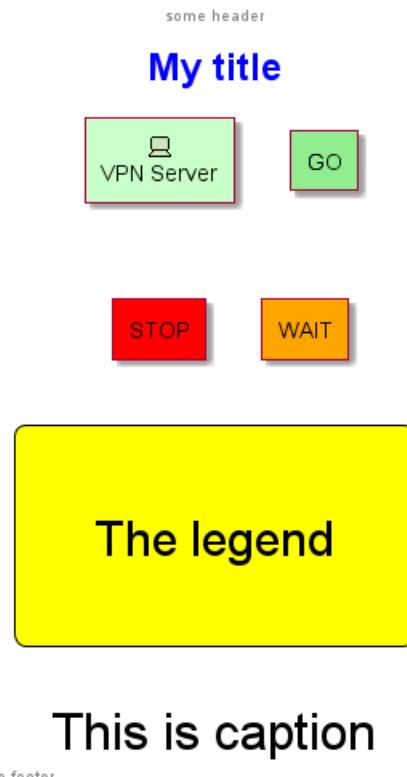
legend
The legend
end legend

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

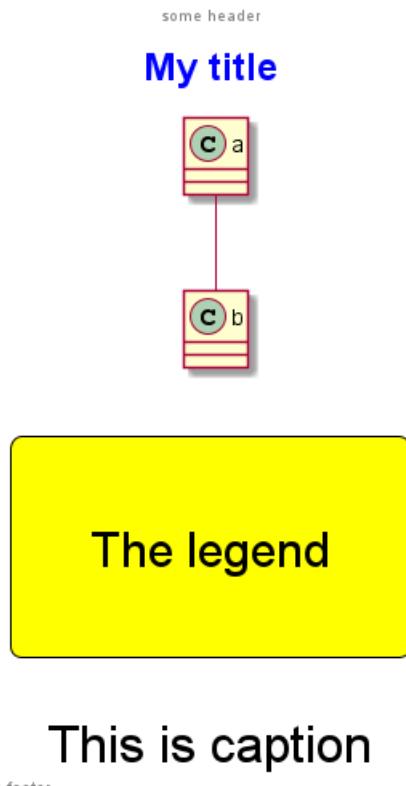
caption This is caption

legend
The legend
end legend

a -- b

@enduml
```





This is caption

#### 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

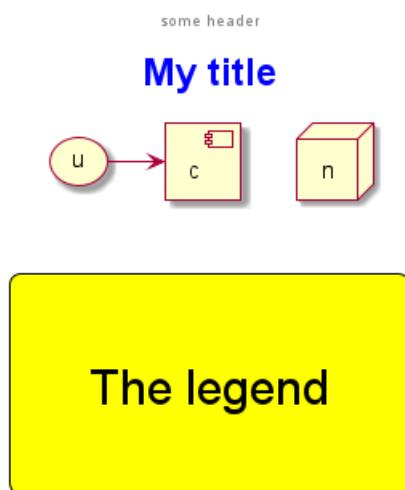
title My title

caption This is caption

legend
The legend
end legend

node n
(u) -> [c]

@enduml
```



This is caption

some footer

### 21.8.5 Gantt project planning

```
@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

```

[t] lasts 5 days

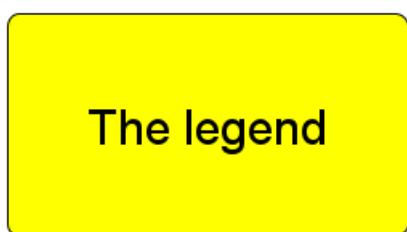
@enduml

some header

## My title

1	2	3	4	5
t				
1	2	3	4	5

The legend



## This is caption

some footer

### 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

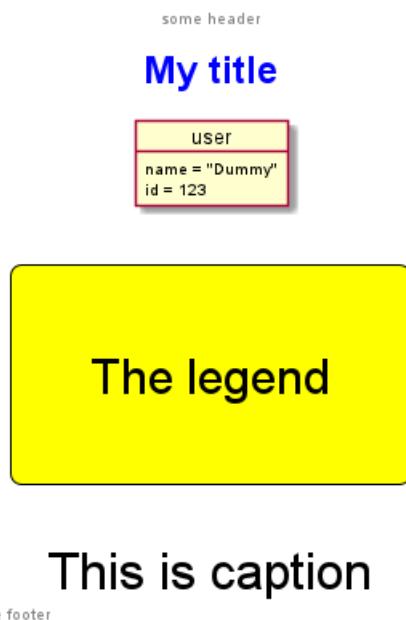
caption This is caption

legend
The legend
end legend

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

@enduml
```





## This is caption

### 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
```

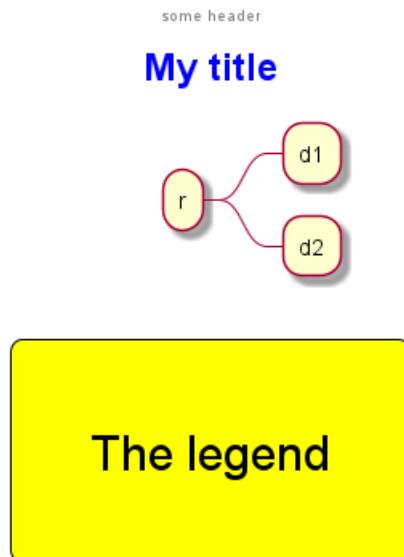


```
caption This is caption
```

```
legend
The legend
end legend
```

```
* r
** d1
** d2
```

```
@endmindmap
```



This is caption

some footer

### 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

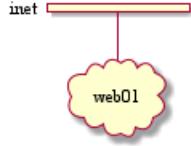
legend
The legend
end legend

nwdiag {
    network inet {
        web01 [shape = cloud]
    }
}

```

@enduml

some header

**My title****The legend****This is caption**

some footer

**21.8.9 Sequence**

```

@startuml
<style>

```

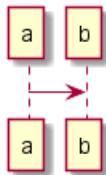


```
title {  
    HorizontalAlignment right  
    FontSize 24  
    FontColor blue  
}  
  
header {  
    HorizontalAlignment center  
    FontSize 26  
    FontColor purple  
}  
  
footer {  
    HorizontalAlignment left  
    FontSize 28  
    FontColor red  
}  
  
legend {  
    FontSize 30  
    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
```



some header

## My title



The legend

This is caption  
some footer

### 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

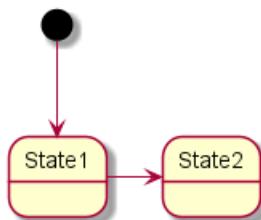
[*] --> State1
State1 -> State2

```

```
@enduml
```

some header

## My title



The legend

This is caption

some footer

### 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
```

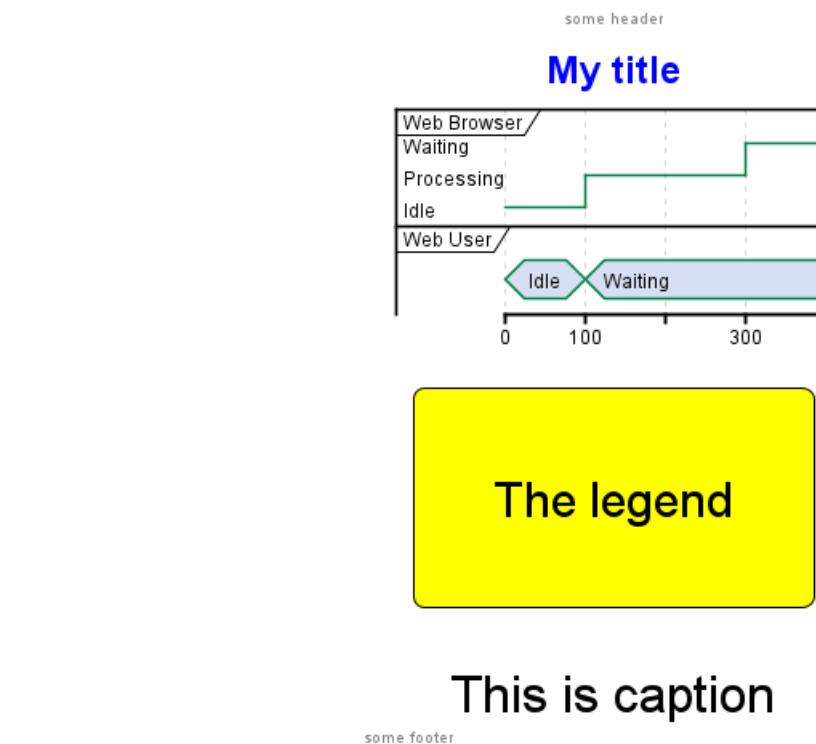
```
@0
WU is Idle
WB is Idle
```

```
@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>
```



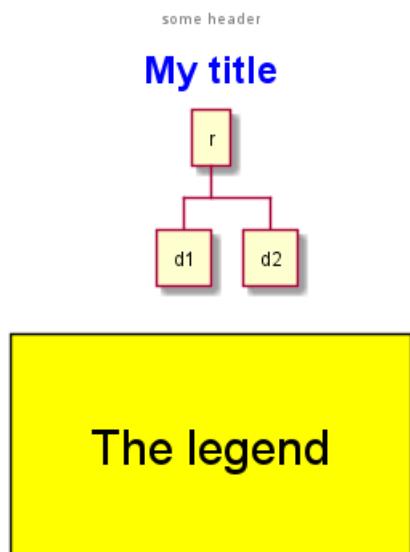
```

header some header
footer some footer
title My title
caption This is caption
legend
The legend
end legend

* r
** d1
** d2

@endwbs

```



This is caption

some footer

### 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
```



## 22 Creole

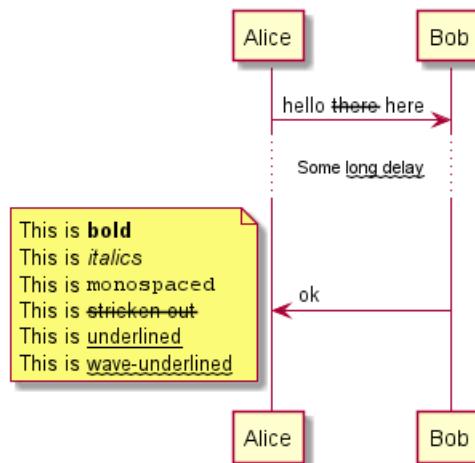
Creole is a lightweight common markup language for various wikis. A light-weight Creole engine is integrated in PlantUML to have a standardized way to emit styled text.

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:**  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

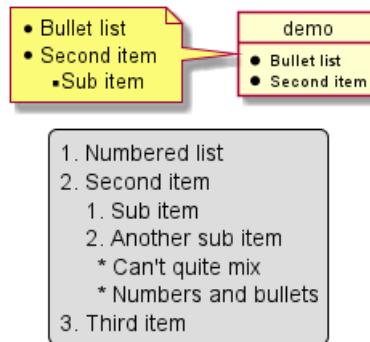
legend
    # Numbered list
    # Second item
```



```

## Sub item
## Another sub item
  * Can't quite mix
  * Numbers and bullets
# Third item
end legend
@enduml

```



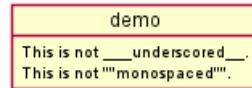
## 22.3 Escape character

You can use the tilde ~ to escape special creole characters.

```

@startuml
object demo {
    This is not ~__underscored__.
    This is not ~"monospaced".
}
@enduml

```



## 22.4 Horizontal lines

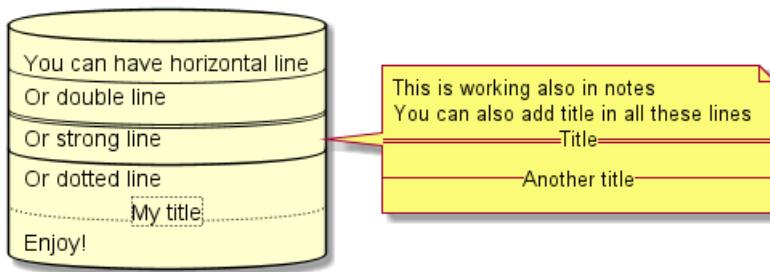
```

@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

```





## 22.5 Headings

```
@startuml
usecase UC1 as "
= Extra-large heading
Some text
== Large heading
Other text
==== Medium heading
Information
....
===== Small heading"
@enduml
```



## 22.6 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
- <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>
```



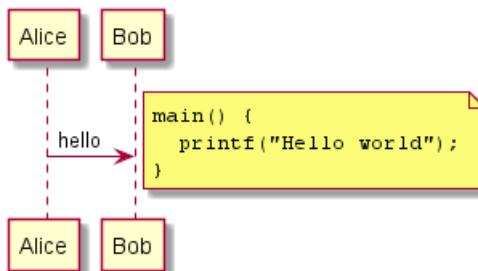
```
* You use <u:red>color</u> <s:green>in HTML</s> <w:#0000FF>tag</w>
-----
* Use image : <img:http://plantuml.com/logo3.png>
;
@enduml
```



## 22.7 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
```

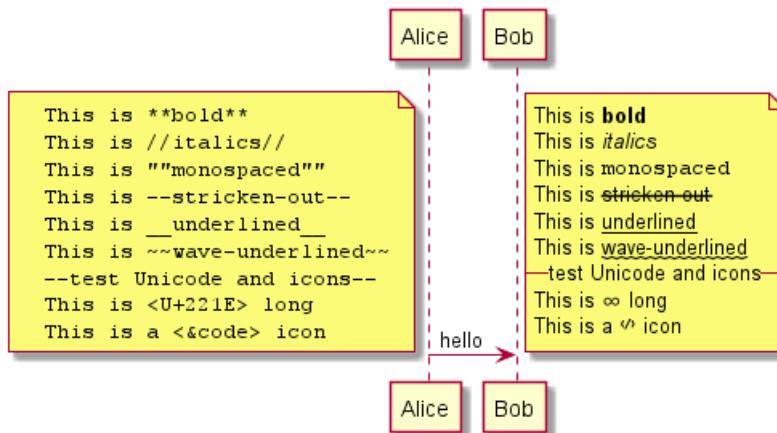


This is especially useful to illustrate some PlantUML code and the resulting rendering:

```
@startuml
Alice -> Bob : hello
note left
<code>
This is **bold**
This is //italics//
This is ""monospaced"""
This is --stricken-out--
This is __underlined__
This is ~~wave-underlined~~
</code>
```



```
--test Unicode and icons--
This is <U+221E> long
This is a <&code> icon
</code>
end note
note right
    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
```



## 22.8 Table

### 22.8.1 Create a table

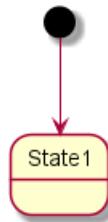
It is possible to build table, with | separator.

```
@startuml
skinparam titleFontSize 14
title
    Example of simple table
    |= |= table |= header |
    | a | table | row |
    | b | table | row |
end title
[*] --> State1
@enduml
```



Example of simple table

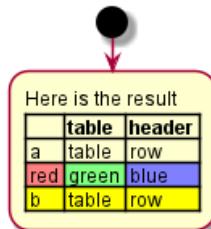
	table	header
a	table	row
b	table	row



### 22.8.2 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
```



### 22.8.3 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://plantuml.com]]
end title
@enduml
```

Step	Date	Name	Status	Link
1.1	TBD	plantuml news	Unknown	plantuml news

[Ref. QA-7184]

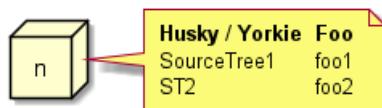
### 22.8.4 No border or same color as the background

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]

### 22.8.5 Bold header or not

= as the first char of a cell indicates whether to make it bold (usually used for headers), or not.

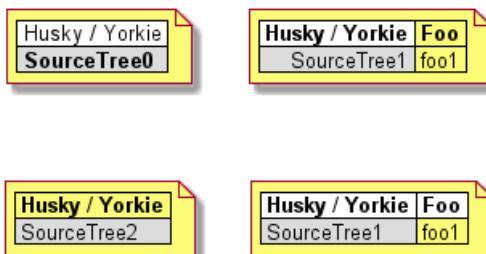
```
@startuml
```

```
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]

## 22.9 Tree

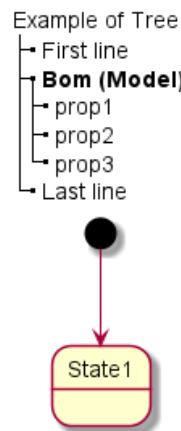
You can use `|_` characters to build a tree.

On common commands, like title:

```
@startuml
skinparam titleFontSize 14
title
Example of Tree
_|_ First line
_|_ **Bom (Model)**
_|_ prop1
_|_ prop2
_|_ prop3
_|_ Last line
```



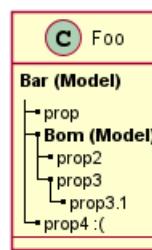
```
end title
[*] --> State1
@enduml
```



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:

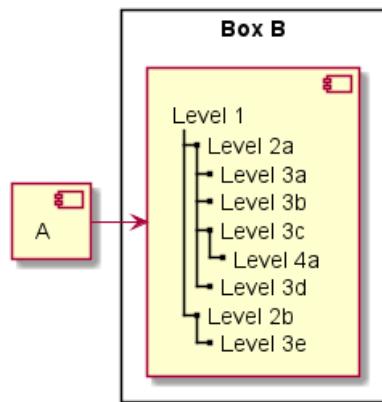
```
@startuml
[A] as A
rectangle "Box B" [
    component B [
        Level 1
        |_ Level 2a
            |_ Level 3a
            |_ Level 3b
            |_ Level 3c
                |_ Level 4a
                |_ Level 3d
        |_ Level 2b
    ]
]
```



```

    |_ Level 3e
]
}
A -> B
@enduml

```



[Ref. QA-11365]

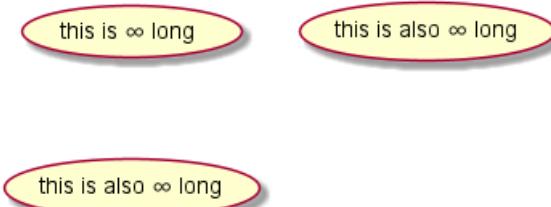
## 22.10 Special characters

It's possible to use any unicode character, either directly or with syntax &#XXX or <U+XXXX>:

```

@startuml
usecase direct as "this is ☺ long"
usecase ampHash as "this is also &#8734; long"
usecase angleBrackets as "this is also <U+221E> long"
@enduml

```



## 22.11 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.

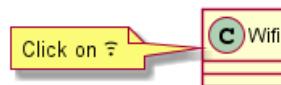
Use the following syntax: <&ICON\_NAME>.

```

@startuml
title: <size:20><&heart>Use of OpenIconic<&heart></size>
class Wifi
note left
    Click on <&wifi>
end note
@enduml

```

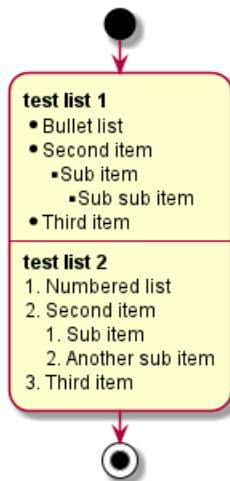
♥Use of OpenIconic♥



The complete list is available at the OpenIconic Website, or you can use the following special command to list them:

```
@startuml
listopeniconic
@enduml
```

<b>List Open Iconic</b>	<b>bell</b>	<b>cloud</b>	<b>excerpt</b>	<b>justify-right</b>	<b>musical-note</b>	<b>star</b>
<i>Credit to</i>						
<a href="https://useiconic.com/open">https://useiconic.com/open</a>						
<b>B bold</b>						
				</td		



### 22.12.2 Class

**TODO:** FIXME □

- *Sub item*
- *Sub sub item*

**TODO:** FIXME

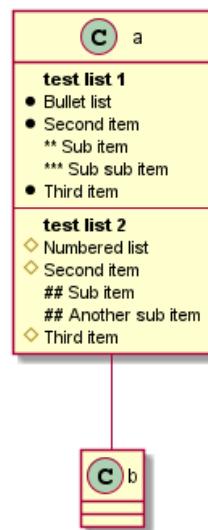
@startuml

```
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



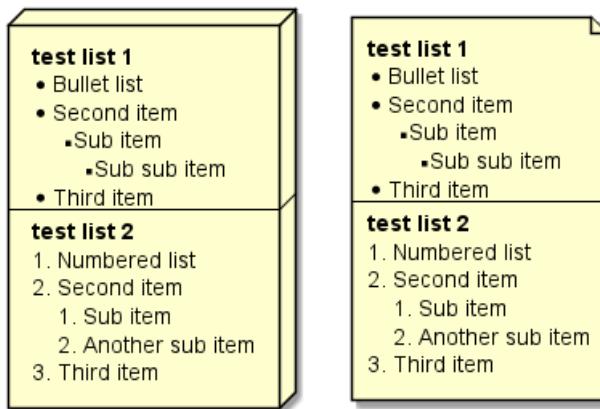


### 22.12.3 Component, Deployment, Use-Case

```
@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]

#### 22.12.4 Gantt project planning

N/A

#### 22.12.5 Object

**TODO:** FIXME □

- *Sub item*
- *Sub sub item*

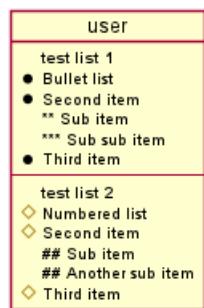
**TODO:** FIXME

```

@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

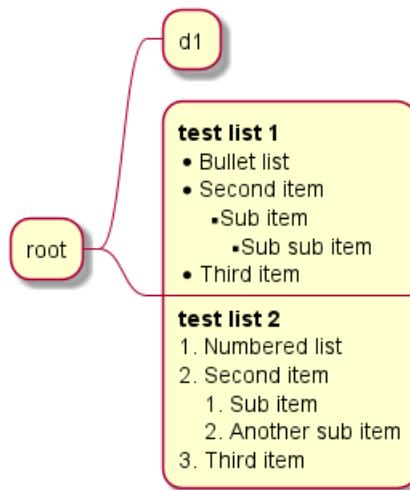


### 22.12.6 MindMap

@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



### 22.12.7 Network (nwdiag)

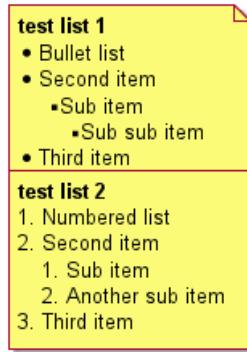
N/A

### 22.12.8 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
```



### 22.12.9 Sequence

N/A (*or on note or common commands*)

### 22.12.10 State

N/A (*or on note or common commands*)

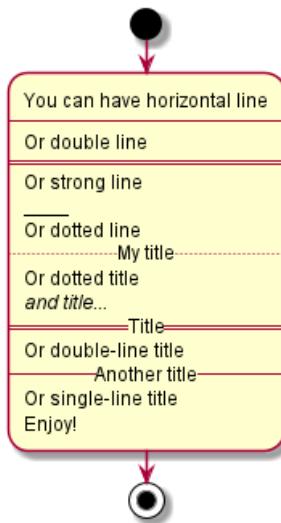
## 22.13 Appendix: Examples of "Creole horizontal lines" on all diagrams

### 22.13.1 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
```





### 22.13.2 Class

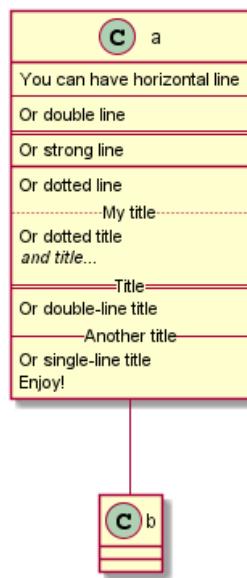
```
@startuml
```

```
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
```





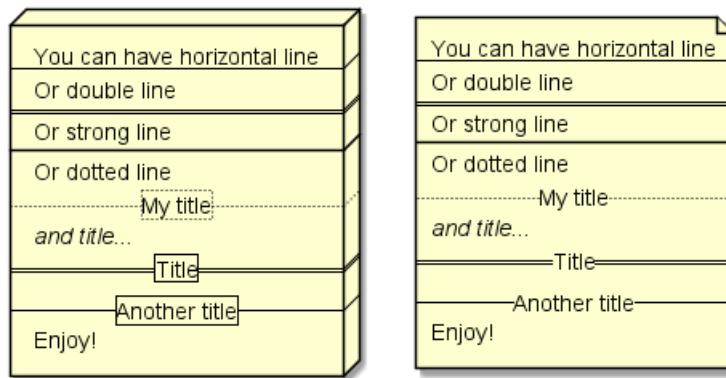
### 22.13.3 Component, Deployment, Use-Case

```

@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!
"
@enduml
  
```





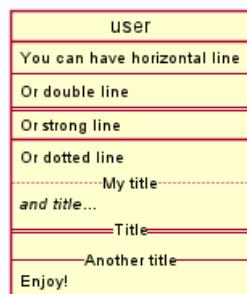
#### 22.13.4 Gantt project planning

N/A

#### 22.13.5 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]

#### 22.13.6 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..
```

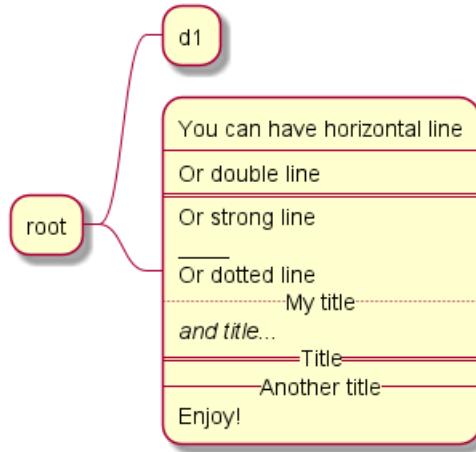
```
//and title... //
```

```
==Title==
```

```
--Another title--
```

```
Enjoy!;
```

```
@endmindmap
```



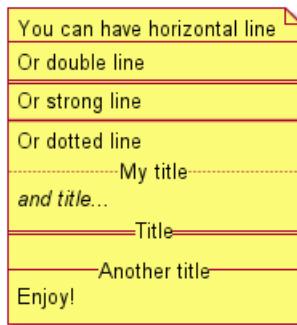
### 22.13.7 Network (nwdiag)

N/A

### 22.13.8 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
```





### 22.13.9 Sequence

N/A (or on note or common commands)

### 22.13.10 State

N/A (or on note or common commands)

## 22.14 Style equivalent (between Creole and HTML)

Style	Creole	Legacy HTML like
<b>bold</b>	This is **bold**	This is <b>bold</b>
<i>italics</i>	This is //italics//	This is <i>italics</i>
monospaced	This is ""monospaced""	This is <font:monospaced>monospaced</font>
stroked	This is --stroked--	This is <s>stroked</s>
<u>underlined</u>	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</font> |
| \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</s> |
| \n This is ""~<u:color:red>"red""</color>"">underlined</u>""\n | \n This is <u:red>underlined</u> |
| \n This is ""~<w:color:#0000FF>"#0000FF""</color>"">waved</w>""\n | \n This is <w:#0000FF>waved</w>
@endmindmap
  
```



Creole	
code	output
This is **bold**	This is <b>bold</b>
This is //italics//	This is <i>italics</i>
This is ""monospaced""	This is monospaced
This is --stroked--	This is <del>stroked</del>
This is __underlined__	This is <u>underlined</u>
This is ~~waved~~	This is <u>waved</u>

Legacy HTML like	
code	output
This is <b>bold</b>	This is <b>bold</b>
This is <i>italics</i>	This is <i>italics</i>
This is <font:monospaced>monospaced</font>	This is monospaced
This is <s>stroked</s>	This is <del>stroked</del>
This is <u>underlined</u>	This is <u>underlined</u>
This is <w>waved</w>	This is <u>waved</u>

And color as a bonus...

code		output
This is <s:green>stroked</s>	This is <del>stroked</del>	
This is <u:red>underlined</u>	This is <u>underlined</u>	
This is <w:#0000FF>waved</w>	This is <u>waved</u>	



## 23 Defining and using sprites

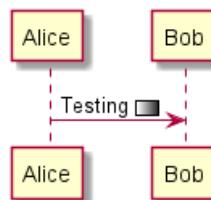
A *Sprite* is a small graphic element that can be used in diagrams.

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.

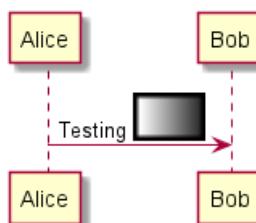
Then you can use the sprite using <\$XXX> where XXX is the name of the sprite.

```
@startuml
sprite $foo1 {
    FFFFFFFFFFFFFF
    F0123456789ABCF
    F0123456789ABCF
    F0123456789ABCF
    F0123456789ABCF
    F0123456789ABCF
    F0123456789ABCF
    F0123456789ABCF
    F0123456789ABCF
    F0123456789ABCF
    F0123456789ABCF
}
Alice -> Bob : Testing <$foo1>
@enduml
```



You can scale the sprite.

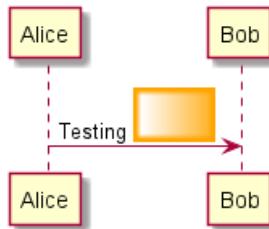
```
@startuml
sprite $foo1 {
    FFFFFFFFFFFFFF
    F0123456789ABCF
    F0123456789ABCF
    F0123456789ABCF
    F0123456789ABCF
    F0123456789ABCF
    F0123456789ABCF
    F0123456789ABCF
    F0123456789ABCF
    F0123456789ABCF
    F0123456789ABCF
}
Alice -> Bob : Testing <$foo1{scale=3}>
@enduml
```



## 23.1 Changing colors

Although sprites are monochrome, it's possible to change their color.

```
@startuml
sprite $foo1 {
    FFFFFFFFFFFFFF
    F0123456789ABCF
    FFFFFFFFFFFFFF
}
Alice -> Bob : Testing <$foo1,scale=3.4,color=orange>
@enduml
```



## 23.2 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.

## 23.3 Importing Sprite

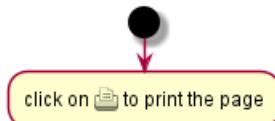
You can also launch the GUI to generate a sprite from an existing image.

Click in the menubar then on `File/Open Sprite Window`.

After copying an image into your clipboard, several possible definitions of the corresponding sprite will be displayed : you will just have to pickup the one you want.

## 23.4 Examples

```
@startuml
sprite $printer [15x15/8z] N0tH3W0W208HxFz_kMAhj71HWpa1XC716sz0Pq4MVPEWfBHluxP3L6kbTcizR8tAhzaqFvXwv
start
:click on <$printer> to print the page;
@enduml
```



```

@startuml
sprite $bug [15x15/16z] PKzR2i0m2BFMi15p__FEjQEqB1z27aeqCqixa8S40T7C53cKpsHpaYPDJY_12MHM-BLRyywPhrr
sprite $printer [15x15/8z] N0tH3W0W208HxFz_kMAhj71HWpa1XC716sz0Pq4MVPEWfBHIuxP3L6kbTcizR8tAhzaqFvXw
sprite $disk {
    444445566677881
    4360000000009991
    436000000000ACA1
    53700000001A7A1
    53700000012B8A1
    53800000123B8A1
    63800001233C9A1
    634999AABC99B1
    744566778899AB1
    7456AAAAA99AAB1
    8566AFC228AABB1
    8567AC8118BBBB1
    867BD4433BBBBB1
    39AAAAABBBBBBC1
}

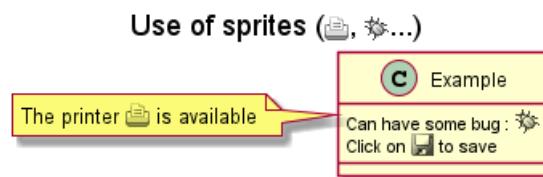
title Use of sprites (<$printer>, <$bug>...)

class Example {
    Can have some bug : <$bug>
    Click on <$disk> to save
}

note left : The printer <$printer> is available

@enduml

```



## 23.5 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

## 23.6 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-icon/master/sprites/osaUser.puml
!include osaPuml/Common.puml
!include osaPuml/User/all.puml
```

```
listsprites
```

```
@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 command

You can change colors and font of the drawing using the `skinparam` command.

Example:

```
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

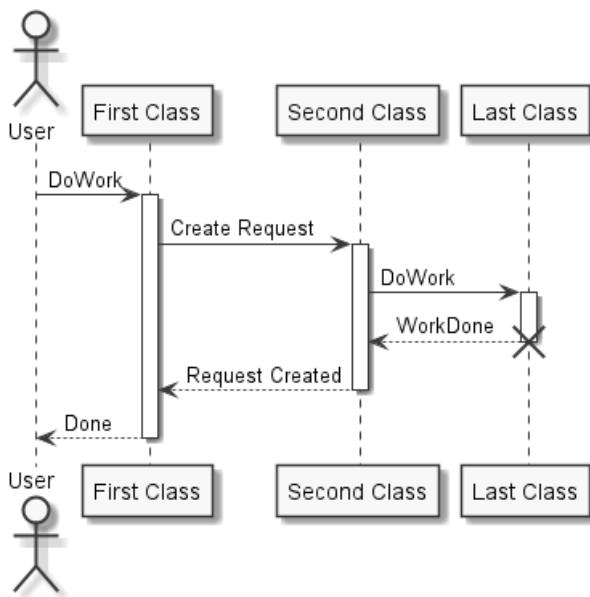
B -> C: DoWork
activate C
C --> B: WorkDone
destroy C

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.

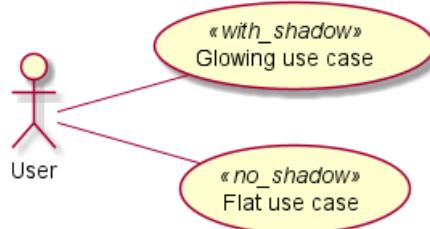
```
@startuml
```

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
```

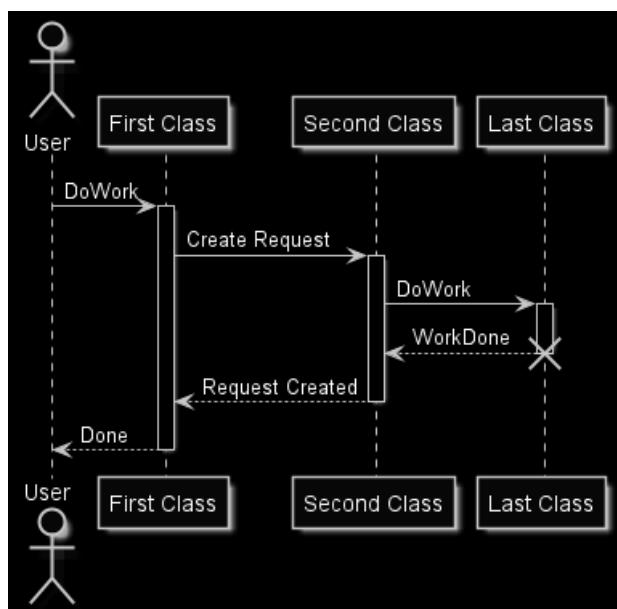
```
A -> B: Create Request
activate B
```

```
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 system.

A lot of parameters are available. You can list them using the following command:

```
java -jar plantuml.jar -language
```

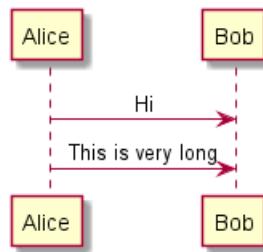
## 24.8 Text Alignment

Text alignment can be set up to `left`, `right` or `center`. You can also use `direction` or `reverseDirection` values for `sequenceMessageAlign` which align text depending on arrow direction.

Param name	Default value	Comment
<code>sequenceMessageAlign</code>	left	Used for messages in sequence diagrams
<code>sequenceReferenceAlign</code>	center	Used for <code>ref</code> over in sequence diagrams

```
@startuml
skinparam sequenceMessageAlign center
Alice -> Bob : Hi
Alice -> Bob : This is very long
@enduml
```





## 24.9 Examples

```

@startuml
skinparam backgroundColor #EEEBCD
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

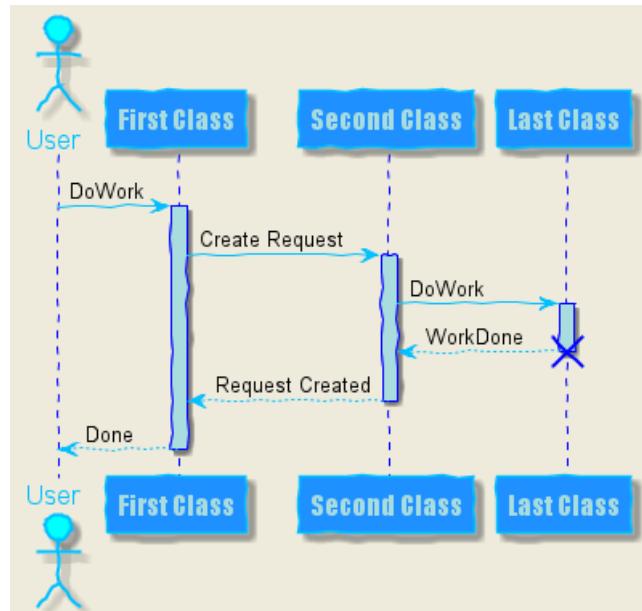
B -> C: DoWork
activate C
C --> B: WorkDone
destroy C

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
}

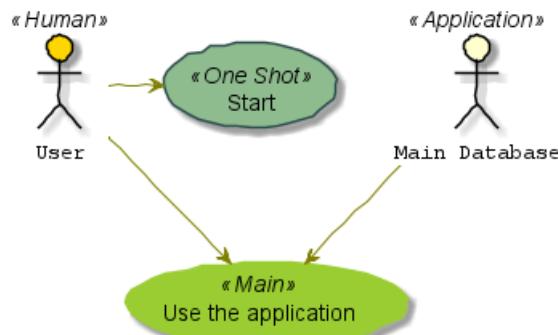
User << Human >>
:Main Database: as MySql << Application >>
(Start) << One Shot >>
(Use the application) as (Use) << Main >>

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

MySql --> (Use)
@enduml

```





```

@startuml
skinparam roundcorner 20
skinparam class {
BackgroundColor PaleGreen
ArrowColor SeaGreen
BorderColor SpringGreen
}
skinparam stereotypeCBackgroundColor YellowGreen

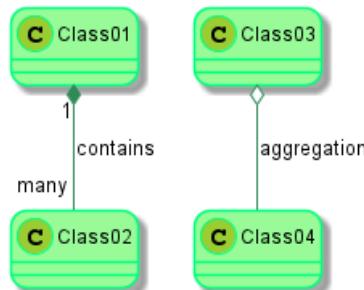
Class01 "1" *-- "many" Class02 : contains

```

```

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
}

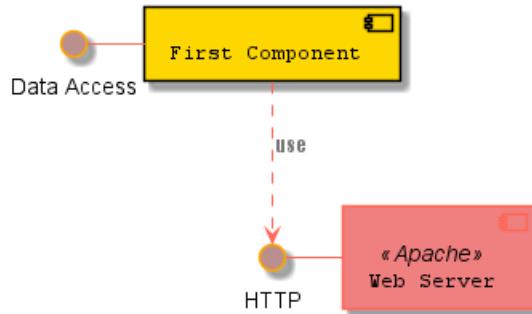
() "Data Access" as DA
[Web Server] << Apache >>

DA - [First Component]

```



```
[First Component] ..> () HTTP : use
HTTP - [Web Server]
@enduml
```

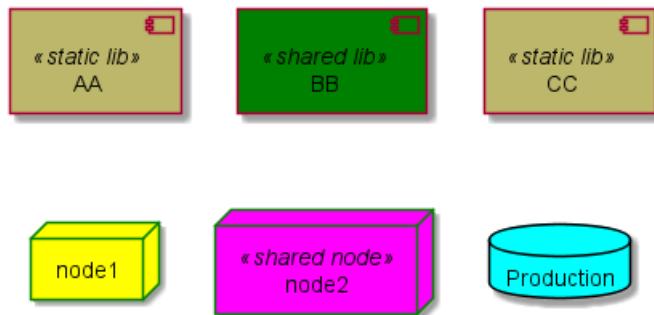


```
@startuml
[AA] <<static lib>>
[BB] <<shared lib>>
[CC] <<static lib>>

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

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
```

Or you can generate a "diagram" with a list of all the skinparam parameters using `help skinparams`.

That will give you the following result, from this page (*code of this command*):

- CommandHelpSkinparam.java

```
@startuml
help skinparams
```



```
@enduml
```



### Help on skinparam

The code of this command is located in `net.sourceforge.plantuml.help` package.

You may improve it on <https://github.com/plantuml/plantuml/tree/master/src/net/sourceforge/plantuml/help>

The possible skinparam are :

- ActivityBackgroundColor
- ActivityBarColor
- ActivityBorderColor
- ActivityBorderThickness
- ActivityDiamondBackgroundColor
- ActivityDiamondBorderColor
- ActivityDiamondFontColor
- ActivityDiamondFontName
- ActivityDiamondFontSize
- ActivityDiamondFontStyle
- ActivityEndColor
- ActivityFontColor
- ActivityFontName
- ActivityFontSize
- ActivityFontStyle
- ActivityStartColor
- ActorBackgroundColor
- ActorBorderColor
- ActorFontColor
- ActorFontName
- ActorFontSize
- ActorFontStyle
- ActorStereotypeFontColor
- ActorStereotypeFontName
- ActorStereotypeFontSize
- ActorStereotypeFontStyle
- AgentBackgroundColor
- AgentBorderColor
- AgentBorderThickness
- AgentFontColor
- AgentFontName
- AgentFontSize
- AgentFontStyle
- AgentStereotypeFontColor
- AgentStereotypeFontName
- AgentStereotypeFontSize
- AgentStereotypeFontStyle
- ArchimateBackgroundColor
- ArchimateBorderColor
- ArchimateBorderThickness
- ArchimateFontColor
- ArchimateFontName
- ArchimateFontSize
- ArchimateFontStyle
- ArchimateStereotypeFontColor
- ArchimateStereotypeFontName
- ArchimateStereotypeFontSize
- ArchimateStereotypeFontStyle
- ArrowColor
- ArrowFontColor
- ArrowFontName
- ArrowFontSize
- ArrowFontStyle
- ArrowHeadColor
- ArrowLollipopColor
- ArrowMessageAlignment
- ArrowThickness



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 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.

### 25.2 Variable definition

Although this is not mandatory, we highly suggest that variable names start with a \$.

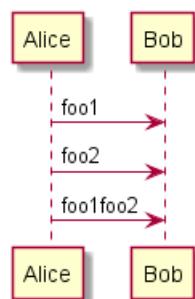
There are two types of data:

- **Integer number (int);**
- **String (str)** - these must be surrounded by single quote or double quote.

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
!$ab = "foo1"
!$cd = "foo2"
!$ef = $ab + $cd

Alice -> Bob : $ab
Alice -> Bob : $cd
Alice -> Bob : $ef
@enduml
```



## 25.3 Boolean expression

### 25.3.1 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]

### 25.3.2 Boolean operation and operator [&&, ||, 0]

You can use boolean expression, in the test, with :

- *parenthesis ()*;
- *and operator &&*;
- *or operator ||*.

(See next example, within *if test*.)

### 25.3.3 Boolean builtin functions [%false(), %true(), %not(<exp>)]

For convenience, you can use those boolean builtin functions:

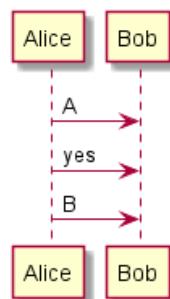
- `%false()`
- `%true()`
- `%not(<exp>)`

[See also *Builtin functions*]

## 25.4 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
```

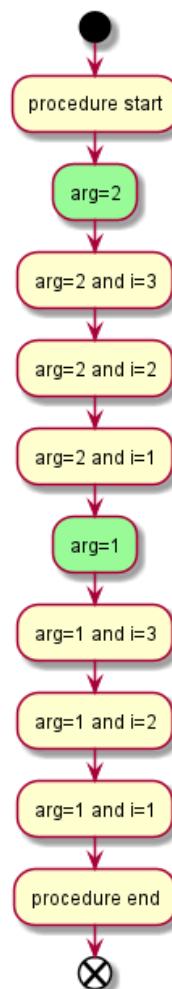


## 25.5 While loop [!while, !endwhile]

You can use `!while` and `!endwhile` keywords to have repeat loops.

```
@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]

```
@startmindmap
!procedure $foo($arg)
```



```

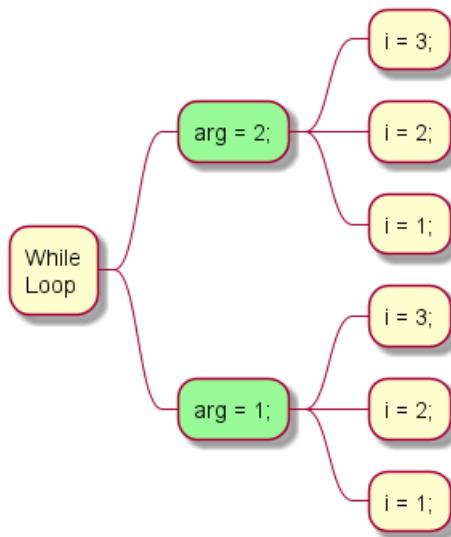
!while $arg!=0
 !$i=3
 **[#palegreen] arg = $arg;
 !while $i!=0
   *** i = $i;
   !$i = $i - 1
 !endwhile
 !$arg = $arg - 1
 !endwhile
!endprocedure

```

```

*:While
Loop;
$foo(2)
@endmindmap

```



## 25.6 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

```

```

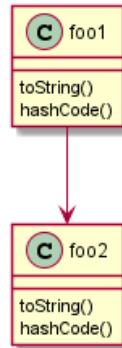
!procedure $addCommonMethod()
  toString()
  hashCode()

```



```
!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.

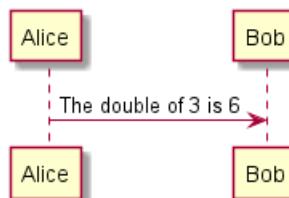
## 25.7 Return function [*!function*, *!endfunction*]

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
```

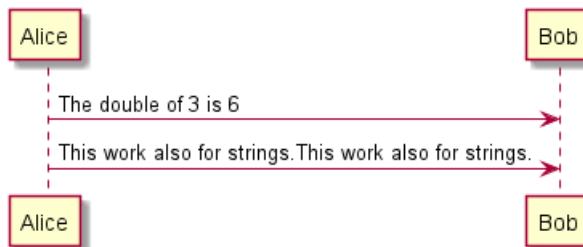


It is possible to shorten simple function definition in one line:

```
@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.

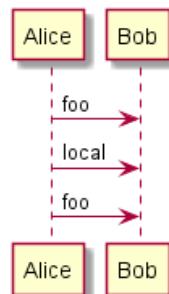
```

@startuml
!function $dummy()
!local $ijk = "local"
!return "Alice -> Bob : " + $ijk
!endfunction

!global $ijk = "foo"

Alice -> Bob : $ijk
$dummy()
Alice -> Bob : $ijk
@enduml

```



## 25.8 Default argument value

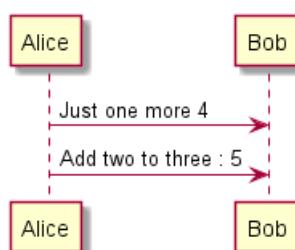
In both procedure and return functions, you can define default values for arguments.

```

@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.

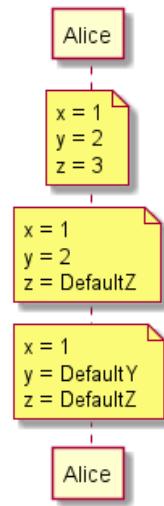


```

@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

```



## 25.9 Unquoted procedure or function [!unquoted]

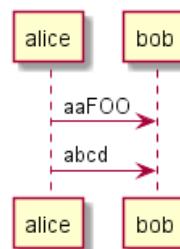
By default, you have to put quotes when you call a function or a procedure. It is possible to use the unquoted keyword to indicate that a function or a procedure does not require quotes for its arguments.

```

@startuml
!unquoted function id($text1, $text2="FOO") !return $text1 + $text2

alice -> bob : id(aa)
alice -> bob : id(ab,cd)
@enduml

```



## 25.10 Keywords arguments

Like in Python, you can use keywords arguments :

```
@startuml
```

```

!unquoted procedure $element($alias, $description="", $label="", $technology="", $size=12, $colour="g
rectangle $alias as "

```



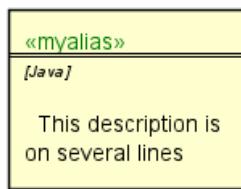
```

<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

```



## 25.11 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.

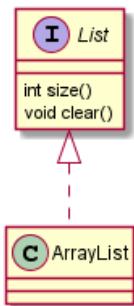
Imagine you have the very same class that appears in many diagrams. Instead of duplicating the description of this class, you can define a file that contains the description.

```
@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.

## 25.12 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
```

## 25.13 Builtin functions [%]

Some functions are defined by default. Their name starts by %



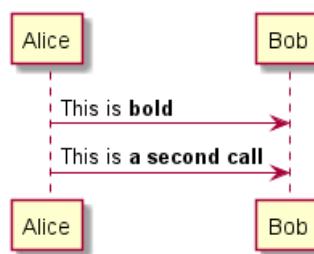
Name	Description	Example
%date	Retrieve current date. You can provide an optional format for the date	%date("yyyy.MM.dd' at")
%dirname	Retrieve current dirname	%dirname()
%false	Return always false	%false()
%file_exists	Check if a file exists on the local filesystem	%file_exists("c:/foo/d")
%filename	Retrieve current filename	%filename()
%function_exists	Check if a function exists	%function_exists("\$some")
%get_variable_value	Retrieve some variable value	%get_variable_value("\$some")
%getenv	Retrieve environment variable value	%getenv("OS")
%intval	Convert a String to Int	%intval("42")
%lower	Return a lowercase string	%lower("Hello")
%newline	Return a newline	%newline()
%not	Return the logical negation of an expression	%not(2+2==4)
%set_variable_value	Set a global variable	%set_variable_value("\$some")
%string	Convert an expression to String	%string(1 + 2)
%strlen	Calculate the length of a String	%strlen("foo")
%strpos	Search a substring in a string	%strpos("abcdef", "ef")
%substr	Extract a substring. Takes 2 or 3 arguments	%substr("abcdef", 3, 2)
%true	Return always true	%true()
%upper	Return an uppercase string	%upper("Hello")
%variable_exists	Check if a variable exists	%variable_exists("\$my")
%version	Return PlantUML current version	%version()

## 25.14 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
```



## 25.15 Memory dump [!memory\_dump]

You can use !memory\_dump to dump the full content of the memory when generating the diagram. An optional string can be put after !memory\_dump. 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
```

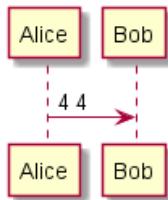


```

!return $val+1
!endfunction

Alice -> Bob : 4 $inc("3")
!unused = "foo"
!dump_memory EOF
@enduml

```



## 25.16 Assertion [*!assert*]

You can put assertions in your diagram.

```

@startuml
Alice -> Bob : Hello
!assert %strpos("abcdef", "cd")==3 : "This always fails"
@enduml

```

Welcome to PlantUML!

You can start with a simple UML Diagram like:

```
Bob->Alice: Hello
```



Or

```
class Example
```

You will find more information about PlantUML syntax on <https://plantuml.com>

(If you use this software, you accept its license)  
(Details by typing license keyword)

```

PlantUML 1.2021.3beta6
[From string (line 3) ]

@startuml
Alice -> Bob : Hello
!assert %strpos("abcdef", "cd")==3 : "This always fails"
Assertion error : This always fails

```

## 25.17 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
...
```

## 25.18 Search path

You can specify the java property `plantuml.include.path` in the command line.

For example:

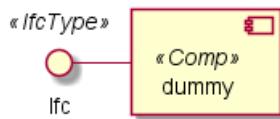
```
java -Dplantuml.include.path="c:/mydir" -jar plantuml.jar atest1.txt
```

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.

## 25.19 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
```



## 25.20 Dynamic invocation [%invoke\_procedure(), %call\_user\_func()]

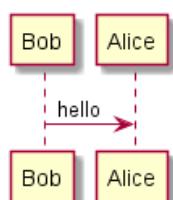
You can dynamically invoke a procedure using the special `%invoke_procedure()` procedure. This procedure takes as first argument the name of the actual procedure to be called. The optional following arguments are copied to the called procedure.

For example, you can have:

```
@startuml
!procedure $go()
Bob -> Alice : hello
!endprocedure

!$wrapper = "$go"

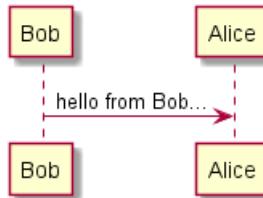
%invoke_procedure($wrapper)
@enduml
```



```
@startuml
!procedure $go($txt)
Bob -> Alice : $txt
!endprocedure
```

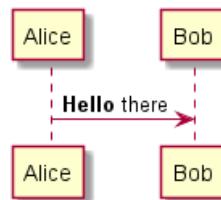


```
%invoke_procedure("$go", "hello from Bob...")  
@enduml
```



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
```



## 25.21 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
```



	<b>\$a</b>	<b>\$b</b>	<b>%string(\$a + \$b)</b>
<b>type</b>	str	str	str (concatenation)
<b>example</b>	"a"	"b"	ab
<b>type</b>	str	int	str (concatenation)
<b>ex.</b>	"a"	2	a2
<b>type</b>	str	int	str (concatenation)
<b>ex.</b>	1	"b"	1b
<b>type</b>	bool	str	str (concatenation)
<b>ex.</b>	%true()	"b"	1b
<b>type</b>	str	bool	str (concatenation)
<b>ex.</b>	"a"	%false()	a0
<b>type</b>	int	int	int (addition of int)
<b>ex.</b>	1	2	3
<b>type</b>	bool	int	int (addition)
<b>ex.</b>	%true()	2	3
<b>type</b>	int	bool	int (addition)
<b>ex.</b>	1	%false()	1
<b>type</b>	int	int	int (addition)
<b>ex.</b>	1	%intval("2")	3

## 25.22 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](#))



## 26 Unicode

The PlantUML language use *letters* to define actor, usecase and soon.

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

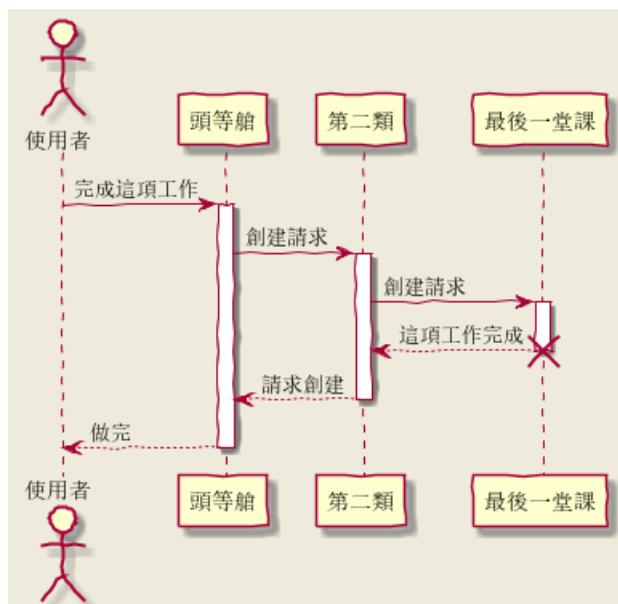
使用者 -> A: 完成這項工作
activate A

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
```

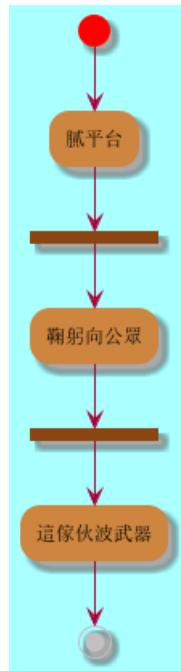


```
@startuml
(*) --> "膩平台"
--> === S1 ===
--> 鞠躬向公眾
```



```
--> === S2 ===
--> 這傢伙波武器
--> (*)
```

```
skinparam backgroundColor #AFFFFF
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
```

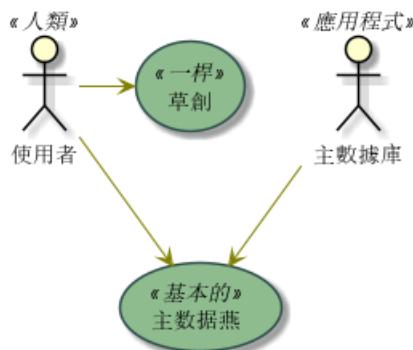
使用者 << 人類 >>  
 "主數據庫" as 數據庫 << 應用程式 >>  
 (草創) << 一桿 >>  
 "主数据燕" as (贏余) << 基本的 >>

使用者 -> (草創)  
 使用者 --> (贏余)

數據庫 --> (贏余)

@enduml





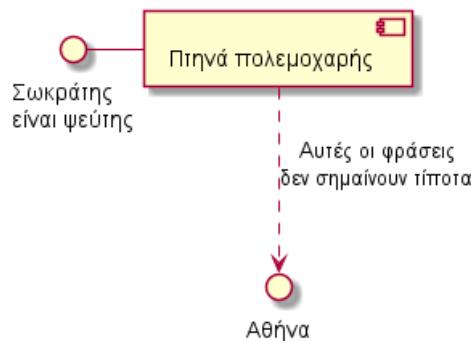
@startuml

() "Σωκράτης" as Σωκράτης

Σωκράτης - [Πτηνά πολεμοχαρής]

[Πτηνά πολεμοχαρής] ..> () Αθήνα : Αυτές οι φράσεις σημαίνουν τίποτα

@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 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.



## 27 Standard Library

This page explains the official Standard Library (`stdlib`) for PlantUML. This Standard Library is now included in official releases of PlantUML. Including files follows the C convention for "C standard library".

Contents of the library come from third party contributors. We thank them for their useful contribution!

### 27.1 List of Standard Library

You can list standard library folders using the special diagram:

```
@startuml
stdlib
@enduml
```

**archimate**  
Version 0.0.1  
Delivered by <https://github.com/ebbypeter/Archimate-PlantUML>

**aws**  
Version 18.02.22  
Delivered by <https://github.com/milo-minderbinder/AWS-PlantUML>

**awslib**  
Version 7.0.0  
Delivered by <https://github.com/awslabs/aws-icons-for-plantuml>

**azure**  
Version 2.1.0  
Delivered by <https://github.com/RicardoNiepel/Azure-PlantUML>

**c4**  
Version 2.0.0  
Delivered by <https://github.com/RicardoNiepel/C4-PlantUML>

**cloudinsight**  
Version 1.0.0  
Delivered by <https://github.com/rabelenda/cicon-plantuml-sprites/>

**cloudogu**  
Version 1.0.2  
Delivered by <https://github.com/cloudogu/plantuml-cloudogu-sprites>

**elastic**  
Version 0.0.1  
Delivered by <https://github.com/Crashedmind/PlantUML-Elastic-icons>

**kubernetes**  
Version 5.3.45  
Delivered by <https://github.com/michiel/plantuml-kubernetes-sprites>

**logos**  
Version 1.0.0  
Delivered by <https://github.com/rabelenda/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 2.2.0  
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]

- <https://github.com/plantuml/plantuml-stdlib/tree/master/archimate>
- <https://github.com/ebbypeter/ArchiMate-PlantUML>

This repository contains ArchiMate PlantUML macros and other includes for creating Archimate Diagrams easily and consistently.

```
@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)")

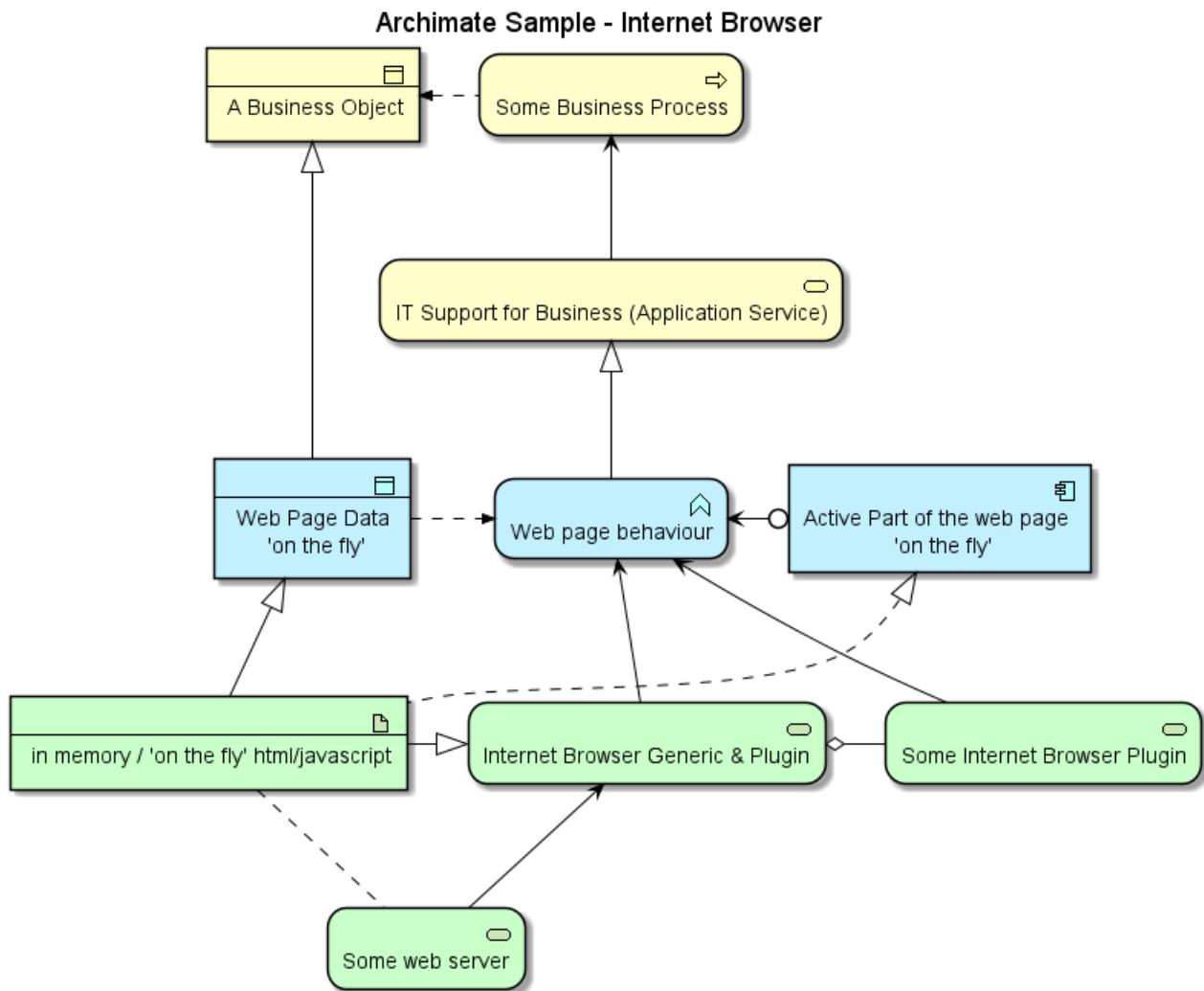
Application_DataObject(dataObject, "Web Page Data \n 'on the fly'")
Application_Function(webpageBehaviour, "Web page behaviour")
Application_Component(ActivePartWebPage, "Active Part of the web page \n 'on the fly')

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
```





### 27.3 AWS library [aws]

- <https://github.com/plantuml/plantuml-stdlib/tree/master/aws>
- <https://github.com/milo-minderbinder/AWS-PlantUML>

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.

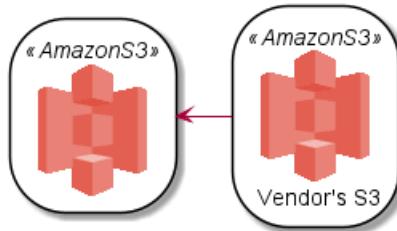
Example of usage:

```

@startuml
!include <aws/common>
!include <aws/Storage/AmazonS3/AmazonS3>

AMAZONS3(s3_internal)
AMAZONS3(s3_partner, "Vendor's S3")
s3_internal <- s3_partner
@enduml
  
```





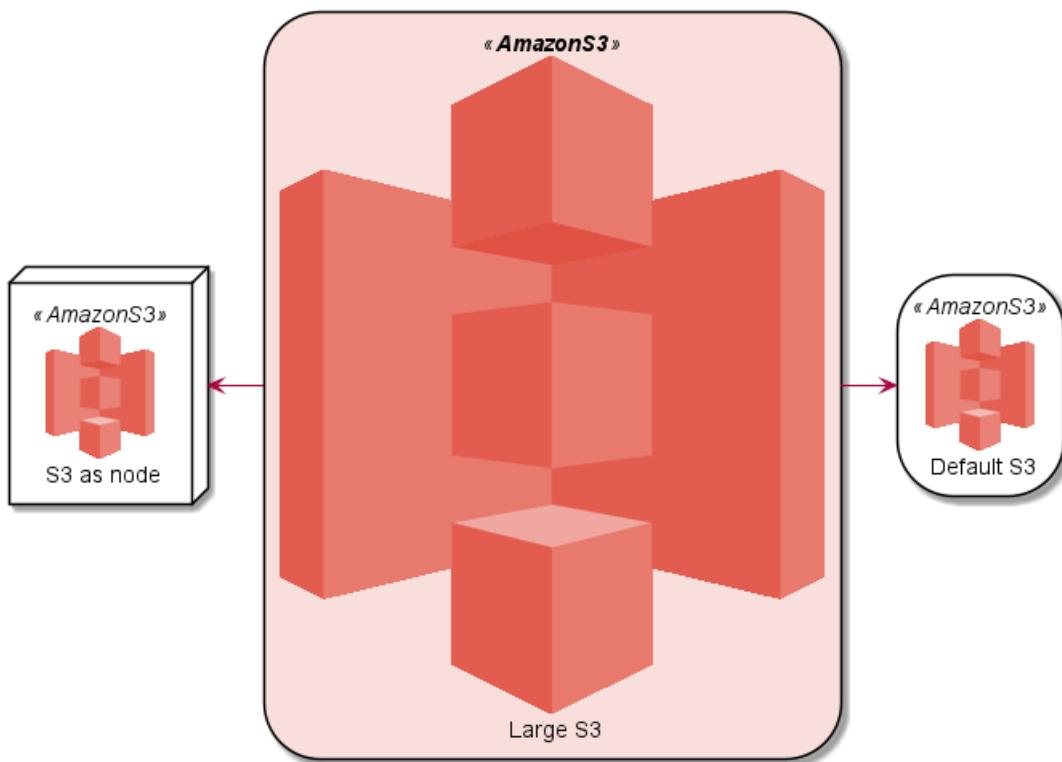
```

@startuml
!include <aws/common>
!include <aws/Storage/AmazonS3/AmazonS3>
!include <aws/Storage/AmazonS3/AmazonS3_LARGE>

skinparam nodeBackgroundColor White
skinparam storage<<**AmazonS3**>> {
    backgroundColor #F9DFDC
}
AMAZONS3(s3_internal,"Default S3")
AMAZONS3(s3_internal2,"S3 as node",node)
AMAZONS3_LARGE(s3_partner,"Large S3")

s3_internal2 <-r- s3_partner
s3_internal <-l- s3_partner
@enduml

```



## 27.4 Amazon Labs AWS Library [awslib]

- <https://github.com/plantuml/plantuml-stdlib/tree/master/awslib>
- <https://github.com/awslabs/aws-icons-for-plantuml>

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
'Copyright 2019 Amazon.com, Inc. or its affiliates. All Rights Reserved.
'SPDX-License-Identifier: MIT (For details, see https://github.com/awslabs/aws-icons-for-plantuml/bl

!include <awslib/AWSCommon>

' Uncomment the following line to create simplified view
' !include <awslib/AWSSimplified>

!include <awslib/General/Users>
!include <awslib/Mobile/APIGateway>
!include <awslib/SecurityIdentityAndCompliance/Cognito>
!include <awslib/Compute/Lambda>
!include <awslib/Database/DynamoDB>

left to right direction

Users(sources, "Events", "millions of users")
APIGateway(votingAPI, "Voting API", "user votes")
Cognito(userAuth, "User Authentication", "jwt to submit votes")
Lambda(generateToken, "User Credentials", "return jwt")
Lambda(recordVote, "Record Vote", "enter or update vote per user")
DynamoDB(voteDb, "Vote Database", "one entry per user")

sources --> userAuth
sources --> votingAPI
userAuth <--> generateToken
votingAPI --> recordVote
recordVote --> voteDb
@enduml
```

## 27.5 Azure library [azure]

- <https://github.com/plantuml/plantuml-stdlib/tree/master/azure>
- <https://github.com/RicardoNiepel/Azure-PlantUML/>

The Azure library consists of Microsoft Azure icons.

Use it by including the file that contains the sprite, eg: !include <azure/Analytics/AzureEventHub.puml>. 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.puml>, 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.puml>
!include <azure/Analytics/AzureEventHub.puml>
!include <azure/Analytics/AzureStreamAnalytics.puml>
!include <azure/Databases/AzureCosmosDb.puml>

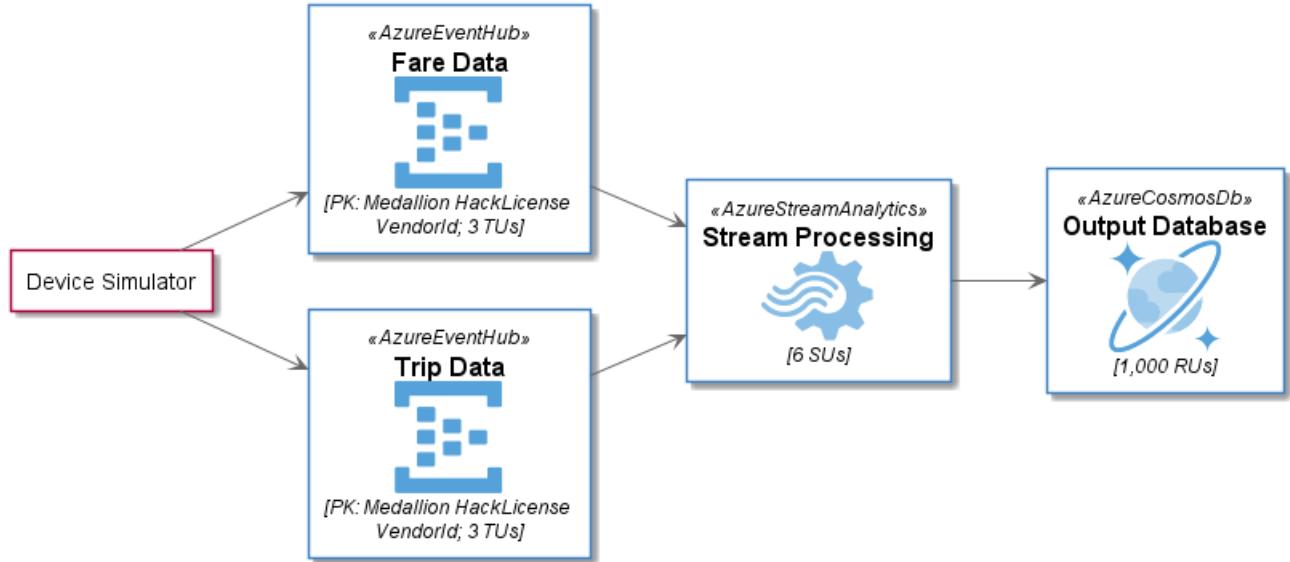
left to right direction

agent "Device Simulator" as devices #ffff
```



```
AzureEventHub(fareDataEventHub, "Fare Data", "PK: Medallion HackLicense VendorId; 3 TUs")
AzureEventHub(tripDataEventHub, "Trip Data", "PK: Medallion HackLicense VendorId; 3 TUs")
AzureStreamAnalytics(streamAnalytics, "Stream Processing", "6 SUs")
AzureCosmosDb(outputCosmosDb, "Output Database", "1,000 RUs")
```

```
devices --> fareDataEventHub
devices --> tripDataEventHub
fareDataEventHub --> streamAnalytics
tripDataEventHub --> streamAnalytics
streamAnalytics --> outputCosmosDb
@enduml
```



## 27.6 C4 Library [C4]

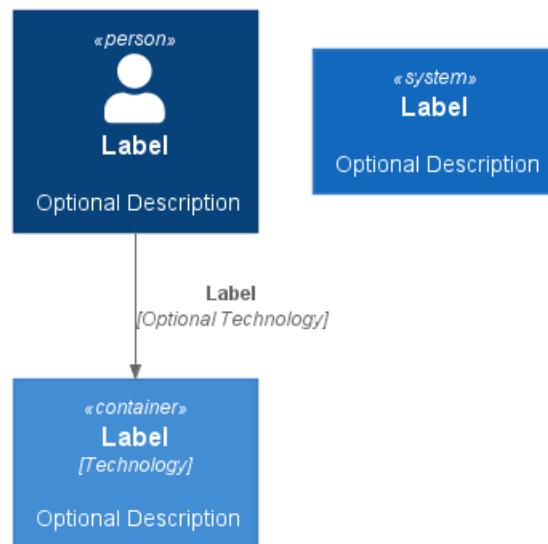
- <https://github.com/plantuml/plantuml-stdlib/tree/master/C4>
- <https://github.com/plantuml-stdlib/C4-PlantUML>

```
@startuml
!include <C4/C4_Container>
```

```
Person(personAlias, "Label", "Optional Description")
Container(containerAlias, "Label", "Technology", "Optional Description")
System(systemAlias, "Label", "Optional Description")

Rel(personAlias, containerAlias, "Label", "Optional Technology")
@enduml
```





## 27.7 Cloud Insight [cloudinsight]

- <https://github.com/plantuml/plantuml-stdlib/tree/master/cloudinsight>
- <https://github.com/rabelenda/cicon-plantuml-sprites>

This repository contains PlantUML sprites generated from Cloudinsight icons, which can easily be used in PlantUML diagrams for nice visual representation of popular technologies.

```

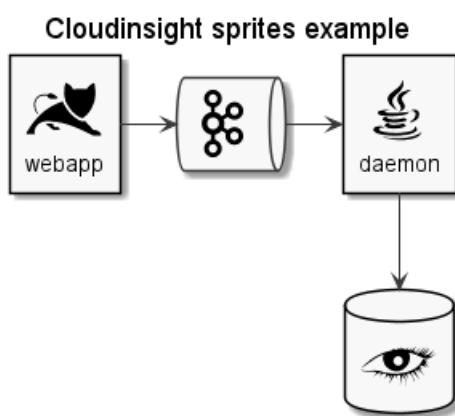
@startuml
!include <cloudinsight/tomcat>
!include <cloudinsight/kafka>
!include <cloudinsight/java>
!include <cloudinsight/cassandra>

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
  
```



## 27.8 Cloudogu [cloudogu]

- <https://github.com/plantuml/plantuml-stdlib/tree/master/cloudogu>
- <https://github.com/cloudogu/plantuml-cloudogu-sprites>
- <https://cloudogu.com>

The Cloudogu library provides PlantUML sprites, macros, and other includes for Cloudogu services and resources.

```
@startuml
!include <cloudogu/common.puml>
!include <cloudogu/dogus/jenkins.puml>
!include <cloudogu/dogus/cloudogu.puml>
!include <cloudogu/dogus/scm.puml>
!include <cloudogu/dogus/smeagol.puml>
!include <cloudogu/dogus/nexus.puml>
!include <cloudogu/tools/k8s.puml>

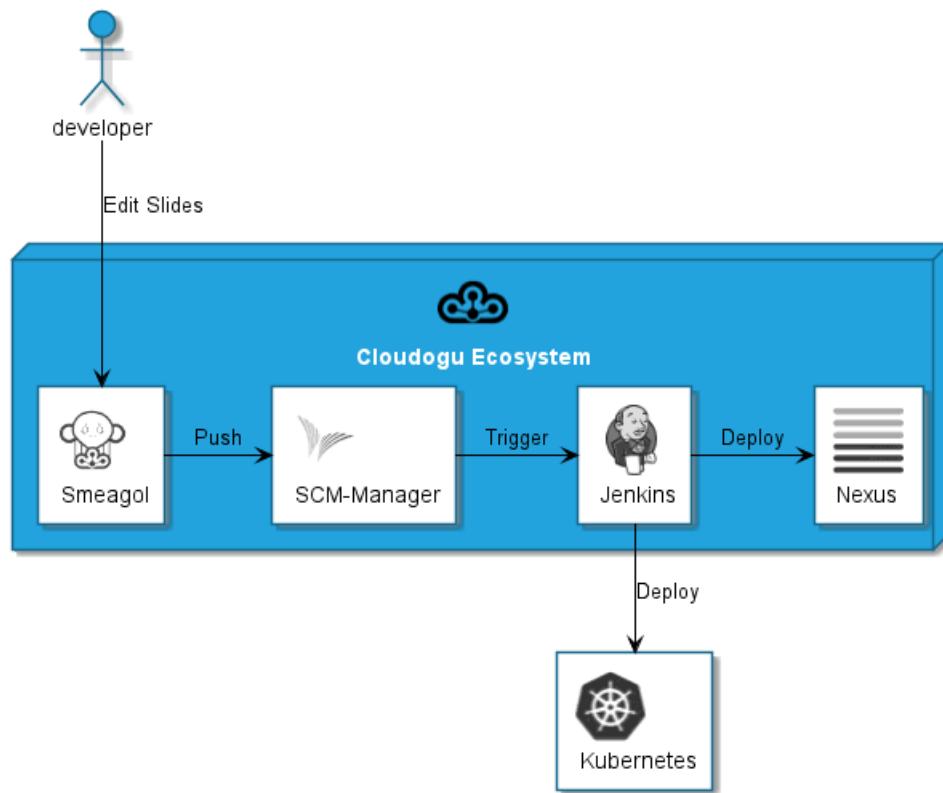
node "Cloudogu Ecosystem" <<$cloudogu>> {
    DOGU_JENKINS(jenkins, Jenkins) #ffffff
    DOGU_SCM(scm, SCM-Manager) #ffffff
    DOGU_SMEAGOL(smeagol, Smeagol) #ffffff
    DOGU_NEXUS(nexus, Nexus) #ffffff
}

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](#).

## 27.9 Elastic library [elastic]

- <https://github.com/plantuml/plantuml-stdlib/tree/master/elastic>
- <https://github.com/Crashedmind/PlantUML-Elastic-icons>

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/elasticsearch/elasticsearch.puml>. 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:

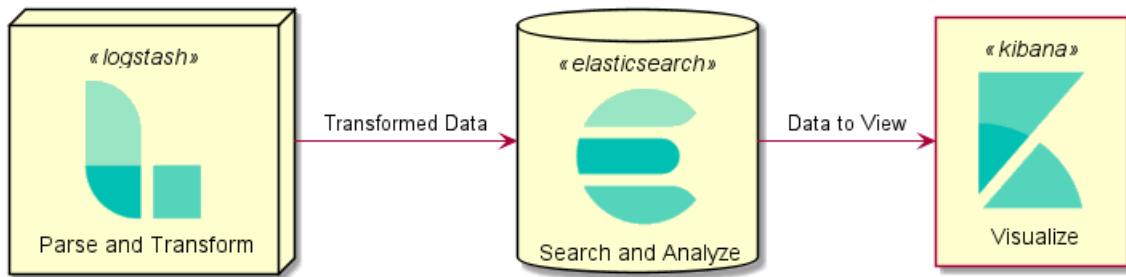
```

@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
'=====

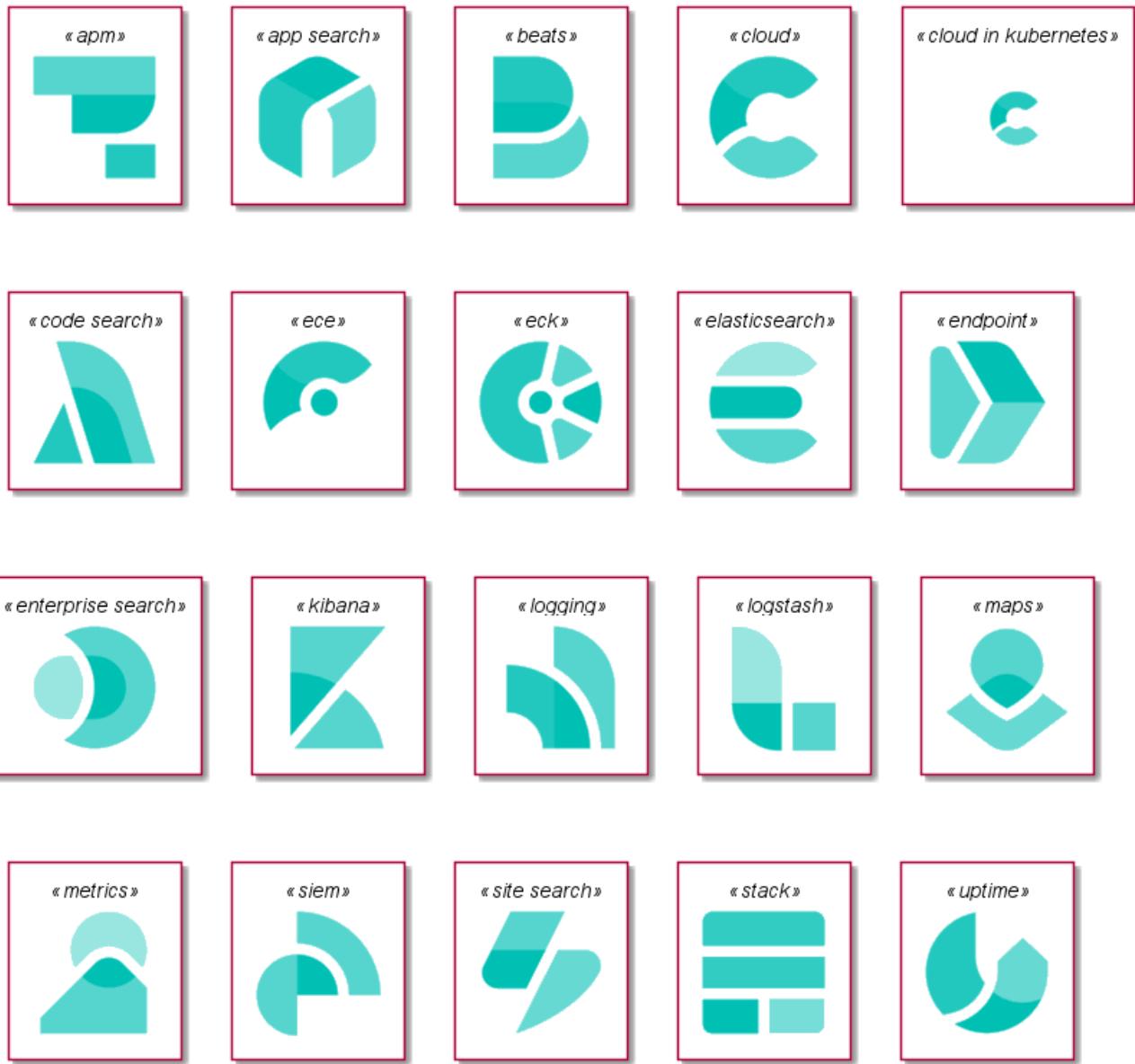
!include <elastic/common.puml>
!include <elastic/apm/apm.puml>
!include <elastic/app_search/app_search.puml>
!include <elastic/beats/beats.puml>
!include <elastic/cloud/cloud.puml>
!include <elastic/cloud_in_kubernetes/cloud_in_kubernetes.puml>
!include <elastic/code_search/code_search.puml>
!include <elastic/ece/ece.puml>
!include <elastic/eck/eck.puml>
' Beware of the difference between Crashedmind and plantuml-stdlib version: with '_' usage!
!include <elastic/elasticsearch/elasticsearch.puml>
!include <elastic/endpoint/endpoint.puml>
!include <elastic/enterprise_search/enterprise_search.puml>
!include <elastic/kibana/kibana.puml>
!include <elastic/logging/logging.puml>
!include <elastic/logstash/logstash.puml>
!include <elastic/maps/maps.puml>
!include <elastic/metrics/metrics.puml>
!include <elastic/siem/siem.puml>
!include <elastic/site_search/site_search.puml>
!include <elastic/stack/stack.puml>
!include <elastic/uptime/uptime.puml>

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
```



## 27.10 Google Material Icons [material]

- <https://github.com/plantuml/plantuml-stdlib/tree/master/material>
- <https://github.com/Templarian/MaterialDesign>

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
```

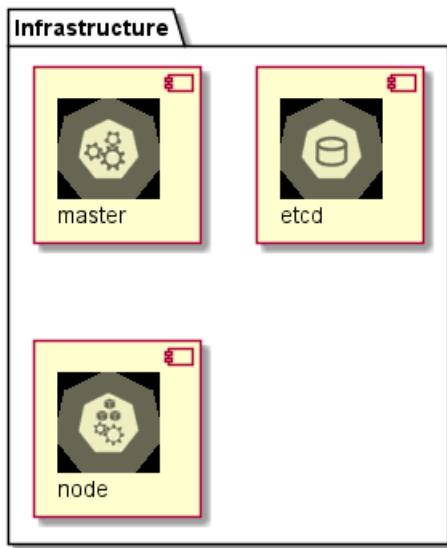


## 27.11 Kubernetes [kubernetes]

- <https://github.com/plantuml/plantuml-stdlib/tree/master/kubernetes>
- <https://github.com/michiel/plantuml-kubernetes-sprites>

```
@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
```





## 27.12 Logos [logos]

- <https://github.com/plantuml/plantuml-stdlib/tree/master/logos>
- <https://github.com/plantuml-stdlib/gilbarbara-plantuml-sprites>

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.puml>
!include <logos/kafka.puml>
!include <logos/kotlin.puml>
!include <logos/cassandra.puml>
```

```
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
```

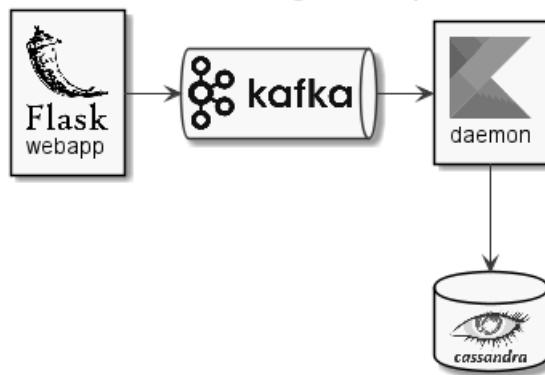
```
webapp -> kafka
```

```
kafka -> daemon
```

```
daemon --> cassandra
```

```
@enduml
```

Gil Barbara's logos example

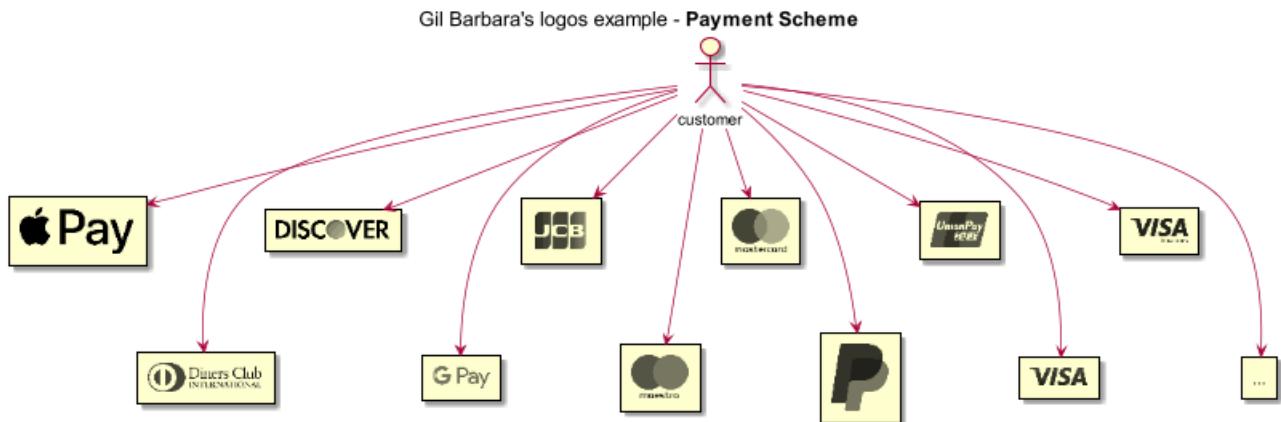


```
@startuml
scale 0.7
!include <logos/apple-pay.puml>
!include <logos/dinersclub.puml>
!include <logos/discover.puml>
!include <logos/google-pay.puml>
!include <logos/jcb.puml>
!include <logos/maestro.puml>
!include <logos/mastercard.puml>
!include <logos/paypal.puml>
!include <logos/unionpay.puml>
!include <logos/visaelectron.puml>
!include <logos/visa.puml>
' ...
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
```





## 27.13 Office [office]

- <https://github.com/plantuml/plantuml-stdlib/tree/master/office>
- <https://github.com/Roemer/plantuml-office>

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>

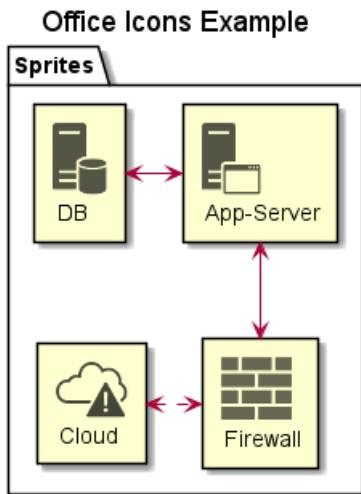
!include <office/Servers/database_server>
!include <office/Servers/application_server>
!include <office/Concepts/firewall_orange>
!include <office/Clouds/cloud_disaster_red>

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

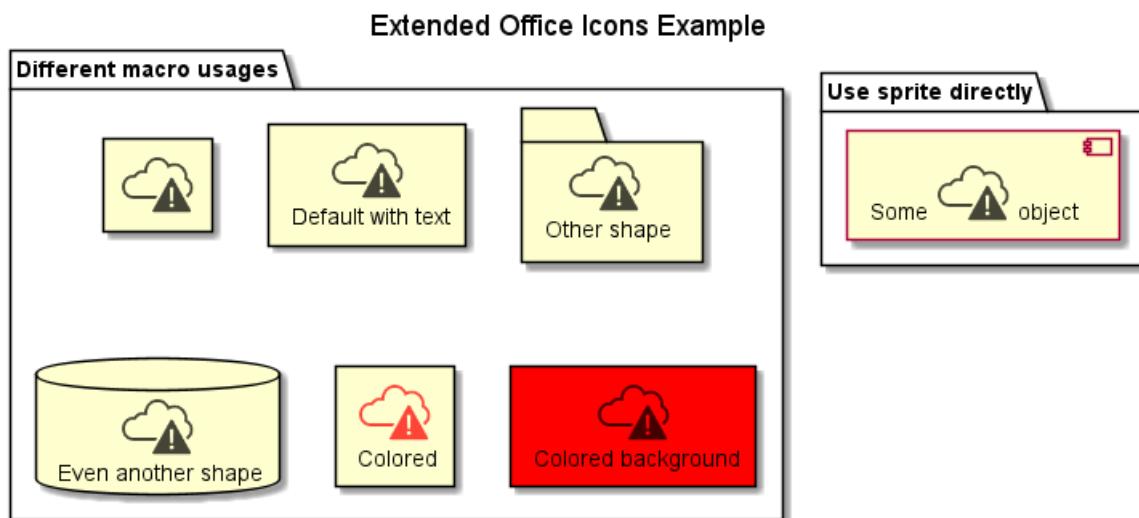
title Extended Office Icons Example

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

```





## 27.14 Open Security Architecture (OSA) [osa]

- <https://github.com/plantuml/plantuml-stdlib/tree/master/osa>
- <https://github.com/Crashedmind/PlantUML-opensecurityarchitecture-icons>
- <https://www.opensecurityarchitecture.org>

```
@startuml
'Adapted from https://github.com/Crashedmind/PlantUML-opensecurityarchitecture-icons/blob/master/all.puml
scale .5
!include <osa/arrow/green/left/left.puml>
!include <osa/arrow/yellow/right/right.puml>
!include <osa/awareness/awareness.puml>
!include <osa/contract/contract.puml>
!include <osa/database/database.puml>
!include <osa/desktop/desktop.puml>
!include <osa/desktop/imac/imac.puml>
!include <osa/device_music/device_music.puml>
!include <osa/device_scanner/device_scanner.puml>
!include <osa/device_usb/device_usb.puml>
!include <osa/device_wireless_router/device_wireless_router.puml>
!include <osa/disposal/disposal.puml>
!include <osa/drive_optical/drive_optical.puml>
!include <osa/firewall/firewall.puml>
!include <osa/hub/hub.puml>
!include <osa/ics/drive/drive.puml>
!include <osa/ics/plc/plc.puml>
!include <osa/ics/thermometer/thermometer.puml>
!include <osa/id/card/card.puml>
!include <osa/laptop/laptop.puml>
!include <osa/lifecycle/lifecycle.puml>
!include <osa/lightning/lightning.puml>
!include <osa/media_flash/media_flash.puml>
!include <osa/media_optical/media_optical.puml>
!include <osa/media_tape/media_tape.puml>
!include <osa/mobile/pda/pda.puml>
!include <osa/padlock/padlock.puml>
!include <osa/printer/printer.puml>
!include <osa/site_branch/site_branch.puml>
!include <osa/site_factory/site_factory.puml>
!include <osa/vpn/vpn.puml>
```



```
!include <osa/wireless/network/network.puml>

rectangle "OSA" {
rectangle "Left: <$left>" 
rectangle "Right: <$right>" 
rectangle "Awareness: <$awareness>" 
rectangle "Contract: <$contract>" 
rectangle "Database: <$database>" 
rectangle "Desktop: <$desktop>" 
rectangle "Imac: <$imac>" 
rectangle "Device_music: <$device_music>" 
rectangle "Device_scanner: <$device_scanner>" 
rectangle "Device_usb: <$device_usb>" 
rectangle "Device_wireless_router: <$device_wireless_router>" 
rectangle "Disposal: <$disposal>" 
rectangle "Drive_optical: <$drive_optical>" 
rectangle "Firewall: <$firewall>" 
rectangle "Hub: <$hub>" 
rectangle "Drive: <$drive>" 
rectangle "Plc: <$plc>" 
rectangle "Thermometer: <$thermometer>" 
rectangle "Card: <$card>" 
rectangle "Laptop: <$laptop>" 
rectangle "Lifecycle: <$lifecycle>" 
rectangle "Lightning: <$lightning>" 
rectangle "Media_flash: <$media_flash>" 
rectangle "Media_optical: <$media_optical>" 
rectangle "Media_tape: <$media_tape>" 
rectangle "Pda: <$pda>" 
rectangle "Padlock: <$padlock>" 
rectangle "Printer: <$printer>" 
rectangle "Site_branch: <$site_branch>" 
rectangle "Site_factory: <$site_factory>" 
rectangle "Vpn: <$vpn>" 
rectangle "Network: <$network>" 
}
@enduml
```





## 27.15 Tupadr3 library [tupadr3]

- <https://github.com/plantuml/plantuml-stdlib/tree/master/tupadr3>
- <https://github.com/tupadr3/plantuml-icon-font-sprites>

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
```

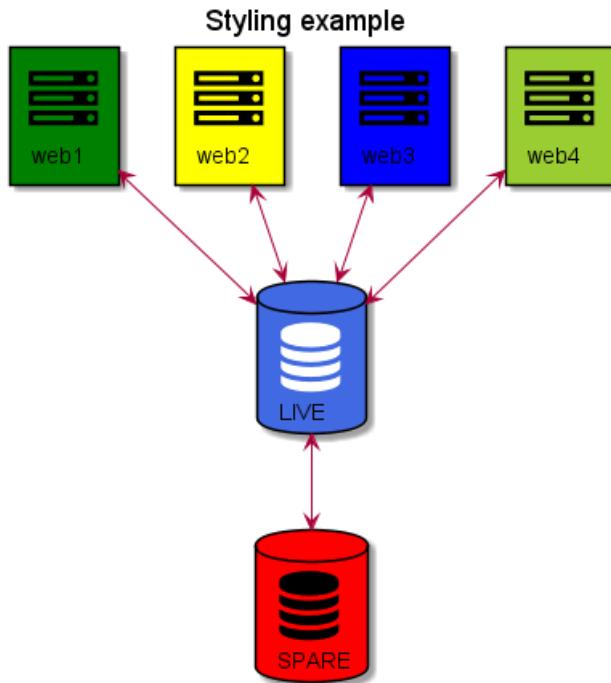
```
web1 <--> db1
```

```
web2 <--> db1
```

```
web3 <--> db1
```

```
web4 <--> db1
```

```
@enduml
```



```
@startuml
```

```
!include <tupadr3/common>
```

```
!include <tupadr3/devicons/mysql>
```

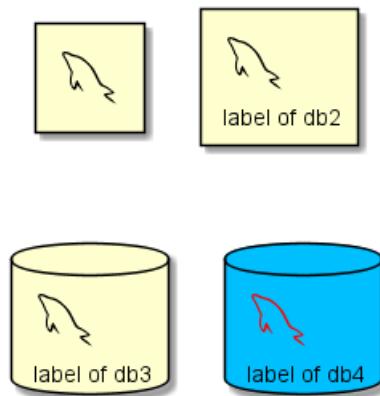
```
DEV_MYSQL(db1)
```

```
DEV_MYSQL(db2,label of db2)
```

```
DEV_MYSQL(db3,label of db3,database)
```

```
DEV_MYSQL(db4,label of db4,database,red) #DeepSkyBlue
```

```
@enduml
```



## Contents

<b>1 Диаграмма последовательности</b>	<b>1</b>
1.1 Основные примеры . . . . .	1
1.2 Объявление участников . . . . .	1
1.3 Использование небуквенных символов в названиях участников . . . . .	3
1.4 Сообщения к самому себе . . . . .	3
1.5 Text alignment . . . . .	3
1.5.1 Text of response message below the arrow . . . . .	3
1.6 Изменение стиля стрелок . . . . .	4
1.7 Изменить цвет стрелок . . . . .	4
1.8 Нумерация сообщений в последовательностях . . . . .	5
1.9 Page Title, Header and Footer . . . . .	7
1.10 Разбиение диаграм . . . . .	8
1.11 Группировка сообщений . . . . .	8
1.12 Secondary group label . . . . .	9
1.13 Примечания в сообщениях . . . . .	10
1.14 Другие примечания . . . . .	11
1.15 Изменение формы примечаний . . . . .	12
1.16 Note over all participants [across] . . . . .	12
1.17 Several notes aligned at the same level [/] . . . . .	13
1.18 Creole и HTML . . . . .	14
1.19 Разделитель . . . . .	15
1.20 Ссылки . . . . .	16
1.21 Задержка на диаграммах . . . . .	16
1.22 Перенос текста . . . . .	17
1.23 Промежутки . . . . .	18
1.24 Активация и деактивация линии существования . . . . .	18
1.25 Return . . . . .	20
1.26 Отображение создания участника процессом . . . . .	20
1.27 Shortcut syntax for activation, deactivation, creation . . . . .	21
1.28 Входящие и исходящие сообщения . . . . .	22
1.29 Short arrows for incoming and outgoing messages . . . . .	23
1.30 Anchors and Duration . . . . .	24
1.31 Шаблоны и отметки . . . . .	24
1.32 Больше информации в заголовках . . . . .	25
1.33 Группировка участников . . . . .	27
1.34 Удаление футера . . . . .	27
1.35 Skinparam . . . . .	28
1.36 Изменение отступов . . . . .	30
1.37 Appendix: Examples of all arrow type . . . . .	31
1.37.1 Normal arrow . . . . .	31
1.37.2 Incoming and outgoing messages (with '[, ']') . . . . .	32
1.37.3 Incoming messages (with '[') . . . . .	32
1.37.4 Outgoing messages (with ']') . . . . .	33
1.37.5 Short incoming and outgoing messages (with '?') . . . . .	34
1.37.6 Short incoming (with '?') . . . . .	34
1.37.7 Short outgoing (with '?') . . . . .	36
1.38 Specific SkinParameter . . . . .	37
1.38.1 By default . . . . .	37
1.38.2 LifelineStrategy . . . . .	38
1.38.3 style strictuml . . . . .	38
1.39 Hide unlinked participant . . . . .	39
<b>2 Диаграмма прецедентов</b>	<b>40</b>
2.1 Прецеденты . . . . .	40
2.2 Актёры . . . . .	40
2.3 Change Actor style . . . . .	41
2.3.1 Stick man ( <i>by default</i> ) . . . . .	41



2.3.2 Awesome man . . . . .	41
2.3.3 Hollow man . . . . .	41
2.4 Описание прецедентов . . . . .	42
2.5 Использование пакетов . . . . .	42
2.6 Простой пример . . . . .	43
2.7 Расширение . . . . .	44
2.8 Использование заметок . . . . .	44
2.9 Шаблоны . . . . .	45
2.10 Смена направления стрелок . . . . .	46
2.11 Разделение диаграмм . . . . .	47
2.12 Направление слева направо . . . . .	47
2.13 Skinparam . . . . .	48
2.14 Полноценный пример . . . . .	49
2.15 Business Use Case . . . . .	49
2.15.1 Business Usecase . . . . .	49
2.15.2 Business Actor . . . . .	50
2.16 Change arrow color and style (inline style) . . . . .	50
2.17 Change element color and style (inline style) . . . . .	51
<b>3 Диаграмма классов . . . . .</b>	<b>52</b>
3.1 Declaring element . . . . .	52
3.2 Отношения между классами . . . . .	52
3.3 Метки на отношениях . . . . .	53
3.4 Добавление методов . . . . .	54
3.5 Указание видимости . . . . .	55
3.6 Абстрактные и статические . . . . .	56
3.7 Расширенное тело класса . . . . .	56
3.8 Заметки и шаблоны . . . . .	57
3.9 Больше о заметках . . . . .	58
3.10 Note on field (field, attribute, member) or method . . . . .	59
3.10.1 Note on field or method . . . . .	59
3.10.2 Note on method with the same name . . . . .	59
3.11 Заметки на связях . . . . .	60
3.12 Абстрактные классы и интерфейсы . . . . .	60
3.13 Использование не буквенных символов . . . . .	61
3.14 Скрытие атрибутов, методов... . . . . .	62
3.15 Скрытие классов . . . . .	63
3.16 Remove classes . . . . .	63
3.17 Hide or Remove unlinked class . . . . .	64
3.18 Использование дженериков . . . . .	65
3.19 Определение метки . . . . .	65
3.20 Пакеты . . . . .	65
3.21 Стили пакетов . . . . .	66
3.22 Пространства имён . . . . .	67
3.23 Автоматическое создание пространств имён . . . . .	68
3.24 Lollipop интерфейс . . . . .	69
3.25 Изменение направления стрелок . . . . .	69
3.26 Ассоциация классов . . . . .	70
3.27 Association on same classe . . . . .	71
3.28 Skinparam . . . . .	71
3.29 Шаблоны со Skinparam . . . . .	72
3.30 Цветовой градиент . . . . .	73
3.31 Помощь в расположении классов . . . . .	73
3.32 Разделение больших файлов . . . . .	74
3.33 Extends and implements . . . . .	75
3.34 Bracketed relations (linking or arrow) style . . . . .	75
3.34.1 Line style . . . . .	75
3.34.2 Line color . . . . .	76



3.34.3 Line thickness . . . . .	77
3.34.4 Mix . . . . .	77
3.35 Change relation (linking or arrow) color and style (inline style) . . . . .	78
3.36 Change class color and style (inline style) . . . . .	78
3.37 Arrows from/to class members . . . . .	79
<b>4 Диаграмма объектов</b>	<b>81</b>
4.1 Определение объектов . . . . .	81
4.2 Отношения между объектами . . . . .	81
4.3 Associations objects . . . . .	81
4.4 Добавление полей . . . . .	82
4.5 Общие с диаграммами классов функции . . . . .	82
4.6 Map table or associative array . . . . .	83
<b>5 Диаграмма деятельности</b>	<b>85</b>
5.1 Простая деятельность . . . . .	85
5.2 Метка на стрелках . . . . .	85
5.3 Изменение направления стрелки . . . . .	85
5.4 Ветвления . . . . .	86
5.5 Больше о ветках . . . . .	87
5.6 Синхронизация . . . . .	88
5.7 Длинное описание активности . . . . .	89
5.8 Заметки . . . . .	89
5.9 Разделы . . . . .	90
5.10 Skipparam . . . . .	91
5.11 Восьмиугольник . . . . .	92
5.12 Полноценный пример . . . . .	92
<b>6 Диаграмма активности (бета)</b>	<b>95</b>
6.1 Простая активность . . . . .	95
6.2 Старт/Стоп . . . . .	95
6.3 Условия . . . . .	96
6.3.1 Ряд проверок (горизонтальное отображение) . . . . .	96
6.3.2 Ряд проверок (вертикальное отображение) . . . . .	97
6.4 Conditional with stop on an action [kill, detach] . . . . .	98
6.5 Повторяющийся цикл . . . . .	99
6.6 Break on a repeat loop [break] . . . . .	100
6.7 Цикл while . . . . .	101
6.8 Паралельная обработка . . . . .	102
6.9 Split processing . . . . .	103
6.9.1 Split . . . . .	103
6.9.2 Input split (multi-start) . . . . .	103
6.9.3 Output split (multi-end) . . . . .	104
6.10 Заметки . . . . .	105
6.11 Цвета . . . . .	106
6.12 Линии без стрелок . . . . .	107
6.13 Стрелки . . . . .	108
6.14 Connector . . . . .	108
6.15 Color on connector . . . . .	109
6.16 Группирование . . . . .	109
6.17 Дорожки . . . . .	110
6.18 Отсоединение . . . . .	111
6.19 SDL . . . . .	112
6.20 Полноценный пример . . . . .	113
6.21 Condition Style . . . . .	115
6.21.1 Inside style (by default) . . . . .	115
6.21.2 Diamond style . . . . .	115
6.21.3 InsideDiamond (or FooI) style . . . . .	116
6.22 Condition End Style . . . . .	117



6.22.1 Diamond style (by default) . . . . .	117
6.22.2 Horizontal line (hline) style . . . . .	118
<b>7 Диаграмма компонентов</b>	<b>120</b>
7.1 Компоненты . . . . .	120
7.2 Интерфейсы . . . . .	120
7.3 Простой пример . . . . .	121
7.4 Использование заметок . . . . .	121
7.5 Группирование компонентов . . . . .	121
7.6 Изменение направления стрелок . . . . .	123
7.7 Use UML2 notation . . . . .	124
7.8 Использование нотации UML1 . . . . .	125
7.9 Use rectangle notation (remove UML notation) . . . . .	125
7.10 Длинное описание . . . . .	126
7.11 Индивидуальные цвета . . . . .	126
7.12 Использование Sprite в стереотипах . . . . .	126
7.13 Skinparam . . . . .	127
7.14 Specific SkinParameter . . . . .	128
7.14.1 componentStyle . . . . .	128
7.15 Hide or Remove unlinked component . . . . .	129
<b>8 Deployment Diagram</b>	<b>131</b>
8.1 Declaring element . . . . .	131
8.2 Declaring element (using short form) . . . . .	133
8.2.1 Actor . . . . .	133
8.2.2 Component . . . . .	134
8.2.3 Interface . . . . .	134
8.2.4 Usecase . . . . .	134
8.3 Linking or arrow . . . . .	134
8.4 Bracketed arrow style . . . . .	137
8.4.1 Line style . . . . .	137
8.4.2 Line color . . . . .	138
8.4.3 Line thickness . . . . .	138
8.4.4 Mix . . . . .	139
8.5 Change arrow color and style (inline style) . . . . .	139
8.6 Change element color and style (inline style) . . . . .	140
8.7 Nestable elements . . . . .	141
8.8 Packages and nested elements . . . . .	141
8.8.1 Example with one level . . . . .	141
8.8.2 Other example . . . . .	142
8.8.3 Full nesting . . . . .	143
8.9 Alias . . . . .	147
8.9.1 Simple alias with as . . . . .	147
8.9.2 Examples of long alias . . . . .	148
8.10 Round corner . . . . .	150
8.11 Specific SkinParameter . . . . .	150
8.11.1 roundCorner . . . . .	150
8.12 Appendix: All type of arrow line . . . . .	151
8.13 Appendix: All type of arrow head or '0' arrow . . . . .	152
8.13.1 Type of arrow head . . . . .	152
8.13.2 Type of '0' arrow or circle arrow . . . . .	153
8.14 Appendix: Test of inline style on all element . . . . .	154
8.14.1 Simple element . . . . .	154
8.14.2 Nested element . . . . .	155
8.14.3 Without sub-element . . . . .	155
8.14.4 With sub-element . . . . .	156
8.15 Appendix: Test of style on all element . . . . .	157
8.15.1 Simple element . . . . .	157
8.15.2 Global style (on componentDiagram) . . . . .	157



8.15.3 Style for each element . . . . .	158
8.15.4 Nested element (without level) . . . . .	161
8.15.5 Global style (on componentDiagram) . . . . .	161
8.15.6 Style for each nested element . . . . .	162
8.15.7 Nested element (with one level) . . . . .	164
8.15.8 Global style (on componentDiagram) . . . . .	164
8.15.9 Style for each nested element . . . . .	165
<b>9 Диаграмма состояний</b>	<b>168</b>
9.1 Простое состояние . . . . .	168
9.2 Change state rendering . . . . .	168
9.3 Составное состояние . . . . .	169
9.4 Длинные имена . . . . .	170
9.5 History [[H], [H*]] . . . . .	171
9.6 Fork [fork, join] . . . . .	172
9.7 Параллельные состояния . . . . .	173
9.8 Conditional [choice] . . . . .	174
9.9 Stereotypes full example [choice, fork, join, end] . . . . .	175
9.10 Point [entryPoint, exitPoint] . . . . .	176
9.11 Pin [inputPin, outputPin] . . . . .	177
9.12 Expansion [expansionInput, expansionOutput] . . . . .	178
9.13 Направления стрелок . . . . .	179
9.14 Change line color and style . . . . .	180
9.15 Заметки . . . . .	180
9.16 Note on link . . . . .	181
9.17 Еще о заметках . . . . .	181
9.18 Inline color . . . . .	182
9.19 Skinparam . . . . .	183
9.20 Changing style . . . . .	184
9.21 Change state color and style (inline style) . . . . .	185
<b>10 Timing Diagram</b>	<b>187</b>
10.1 Declaring participant . . . . .	187
10.2 Binary and Clock . . . . .	187
10.3 Adding message . . . . .	188
10.4 Relative time . . . . .	188
10.5 Anchor Points . . . . .	189
10.6 Participant oriented . . . . .	190
10.7 Setting scale . . . . .	190
10.8 Initial state . . . . .	190
10.9 Intricated state . . . . .	191
10.10 Hidden state . . . . .	192
10.11 Hide time axis . . . . .	192
10.12 Using Time and Date . . . . .	192
10.13 Adding constraint . . . . .	193
10.14 Highlighted period . . . . .	194
10.15 Adding texts . . . . .	195
10.16 Complete example . . . . .	195
10.17 Digital Example . . . . .	196
10.18 Adding color . . . . .	198
<b>11 Display JSON Data</b>	<b>199</b>
11.1 Complex example . . . . .	199
11.2 Highlight parts . . . . .	200
11.3 JSON basic element . . . . .	200
11.3.1 Synthesis of all JSON basic element . . . . .	200
11.4 JSON array or table . . . . .	201
11.4.1 Array type . . . . .	201
11.4.2 Minimal array or table . . . . .	202



11.4.3 Number array . . . . .	202
11.4.4 String array . . . . .	202
11.4.5 Boolean array . . . . .	202
11.5 JSON numbers . . . . .	202
11.6 JSON strings . . . . .	203
11.6.1 JSON Unicode . . . . .	203
11.6.2 JSON two-character escape sequence . . . . .	203
11.7 Minimal JSON examples . . . . .	204
11.8 Using (global) style . . . . .	205
11.8.1 Without style ( <i>by default</i> ) . . . . .	205
11.8.2 With style . . . . .	205
<b>12 Display YAML Data</b> . . . . .	<b>207</b>
12.1 Complex example . . . . .	207
12.2 Specific key (with symbols or unicode) . . . . .	208
12.3 Highlight parts . . . . .	208
12.3.1 Normal style . . . . .	208
12.3.2 Customised style . . . . .	209
12.4 Using (global) style . . . . .	209
12.4.1 Without style ( <i>by default</i> ) . . . . .	209
12.4.2 With style . . . . .	210
<b>13 Network diagram (nwdiag)</b> . . . . .	<b>212</b>
13.1 Simple diagram . . . . .	212
13.2 Define multiple addresses . . . . .	212
13.3 Grouping nodes . . . . .	213
13.3.1 Define group inside network definitions . . . . .	213
13.3.2 Define group outside of network definitions . . . . .	214
13.3.3 Define several groups on same network . . . . .	214
13.3.4 Example with 2 group . . . . .	214
13.3.5 Example with 3 groups . . . . .	215
13.4 Extended Syntax (for network or group) . . . . .	216
13.4.1 Network . . . . .	216
13.4.2 Group . . . . .	217
13.5 Using Sprites . . . . .	218
13.6 Using OpenIconic . . . . .	219
13.7 Same nodes on more than two networks . . . . .	220
13.8 Peer networks . . . . .	221
13.9 Peer networks and group . . . . .	221
13.9.1 Without group . . . . .	221
13.9.2 Group on first . . . . .	222
13.9.3 Group on second . . . . .	223
13.9.4 Group on third . . . . .	224
13.10 Add title, caption, header, footer or legend on network diagram . . . . .	225
13.11 Change width of the networks . . . . .	226
13.12 Other internal networks . . . . .	229
<b>14 Salt (Каркасная схема)</b> . . . . .	<b>231</b>
14.1 Простые виджеты . . . . .	231
14.2 Использование сетки . . . . .	231
14.3 Группа . . . . .	232
14.4 Использование разделителя . . . . .	232
14.5 Древовидный виджет . . . . .	233
14.6 Таблица дерева иерархии . . . . .	233
14.7 Окружающие скобки . . . . .	235
14.8 Добавление вкладок . . . . .	235
14.9 Использование меню . . . . .	236
14.10 Продвинутая таблица . . . . .	237
14.11 Полосы прокрутки . . . . .	237



14.12 Цвет элементов . . . . .	238
14.13 Спрайты . . . . .	239
14.14 OpenIconic . . . . .	239
14.15 Include Salt "on activity diagram" . . . . .	240
14.16 Include salt "on while condition of activity diagram" . . . . .	243
<b>15 Archimate Diagram</b>	<b>245</b>
15.1 Archimate keyword . . . . .	245
15.2 Defining Junctions . . . . .	245
15.3 Example 1 . . . . .	246
15.4 Example 2 . . . . .	247
15.5 List possible sprites . . . . .	248
15.6 ArchiMate Macros . . . . .	248
15.6.1 Archimate Macros and Library . . . . .	248
15.6.2 Archimate elements . . . . .	248
15.6.3 Archimate relationships . . . . .	249
15.6.4 Appendix: Examples of all Archimate RelationTypes . . . . .	250
<b>16 Gantt Diagram</b>	<b>252</b>
16.1 Declaring tasks . . . . .	252
16.1.1 Duration . . . . .	252
16.1.2 Start . . . . .	252
16.1.3 End . . . . .	252
16.1.4 Start/End . . . . .	253
16.2 One-line declaration (with the and conjunction) . . . . .	253
16.3 Adding constraints . . . . .	253
16.4 Short names . . . . .	254
16.5 Customize colors . . . . .	254
16.6 Completion status . . . . .	254
16.7 Milestone . . . . .	254
16.7.1 Relative milestone (use of constraints) . . . . .	255
16.7.2 Absolute milestone (use of fixed date) . . . . .	255
16.7.3 Milestone of maximum end of tasks . . . . .	255
16.8 Hyperlinks . . . . .	255
16.9 Calendar . . . . .	256
16.10 Coloring days . . . . .	256
16.11 Changing scale . . . . .	256
16.11.1 Daily ( <i>by default</i> ) . . . . .	257
16.11.2 Weekly . . . . .	257
16.11.3 Monthly . . . . .	258
16.12 Close day . . . . .	258
16.13 Simplified task succession . . . . .	259
16.14 Separator . . . . .	259
16.15 Working with resources . . . . .	259
16.16 Complex example . . . . .	260
16.17 Comments . . . . .	261
16.18 Using style . . . . .	261
16.18.1 Without style ( <i>by default</i> ) . . . . .	261
16.18.2 With style . . . . .	261
16.19 Add notes . . . . .	263
16.20 Pause tasks . . . . .	265
16.21 Change link colors . . . . .	265
16.22 Tasks or Milestones on the same line . . . . .	266
16.23 Highlight today . . . . .	266
16.24 Task between two milestones . . . . .	266
16.25 Grammar and verbal form . . . . .	267
16.26 Add title, header, footer, caption or legend on gantt diagram . . . . .	267
16.27 Removing Foot Boxes . . . . .	267



<b>17 Ментальные карты</b>	<b>270</b>
17.1 Синтаксис OrgMode . . . . .	270
17.2 Markdown синтаксис . . . . .	270
17.3 Арифметическая нотация . . . . .	271
17.4 Multilines . . . . .	271
17.5 Цвета . . . . .	272
17.6 Убираение рамки . . . . .	272
17.7 Изменение направления ветвления . . . . .	273
17.8 Полный пример . . . . .	273
17.9 Changing style . . . . .	274
17.9.1 node, depth . . . . .	274
17.9.2 boxless . . . . .	275
17.10 Word Wrap . . . . .	276
<b>18 Work Breakdown Structure (WBS)</b>	<b>278</b>
18.1 OrgMode syntax . . . . .	278
18.2 Change direction . . . . .	278
18.3 Arithmetic notation . . . . .	279
18.4 Removing box . . . . .	279
18.4.1 Boxless on Arithmetic notation . . . . .	280
18.4.2 Several boxless node . . . . .	280
18.4.3 All boxless node . . . . .	280
18.4.4 Boxless on OrgMode syntax . . . . .	281
18.4.5 Several boxless node . . . . .	281
18.4.6 All boxless node . . . . .	281
18.5 Colors (with inline or style color) . . . . .	282
18.6 Using style . . . . .	283
18.7 Word Wrap . . . . .	284
<b>19 Maths</b>	<b>287</b>
19.1 Standalone diagram . . . . .	287
19.2 How is this working? . . . . .	288
<b>20 Entity Relationship Diagram</b>	<b>289</b>
20.1 Information Engineering Relations . . . . .	289
20.2 Entities . . . . .	289
20.3 Complete Example . . . . .	290
<b>21 Common commands</b>	<b>292</b>
21.1 Comments . . . . .	292
21.2 Zoom . . . . .	292
21.3 Title . . . . .	292
21.4 Caption . . . . .	293
21.5 Footer and header . . . . .	294
21.6 Legend the diagram . . . . .	294
21.7 Appendix: Examples on all diagram . . . . .	295
21.7.1 Activity . . . . .	295
21.7.2 Archimate . . . . .	295
21.7.3 Class . . . . .	296
21.7.4 Component, Deployment, Use-Case . . . . .	297
21.7.5 Gantt project planning . . . . .	297
21.7.6 Object . . . . .	298
21.7.7 MindMap . . . . .	298
21.7.8 Network (nwdiag) . . . . .	299
21.7.9 Sequence . . . . .	300
21.7.10 State . . . . .	300
21.7.11 Timing . . . . .	301
21.7.12 Work Breakdown Structure (WBS) . . . . .	302
21.7.13 Wireframe (SALT) . . . . .	302



21.8 Appendix: Examples on all diagram with style . . . . .	303
21.8.1 Activity . . . . .	304
21.8.2 Archimate . . . . .	305
21.8.3 Class . . . . .	307
21.8.4 Component, Deployment, Use-Case . . . . .	308
21.8.5 Gantt project planning . . . . .	309
21.8.6 Object . . . . .	310
21.8.7 MindMap . . . . .	312
21.8.8 Network (nwdiag) . . . . .	313
21.8.9 Sequence . . . . .	314
21.8.10 State . . . . .	316
21.8.11 Timing . . . . .	317
21.8.12 Work Breakdown Structure (WBS) . . . . .	319
21.8.13 Wireframe (SALT) . . . . .	320
<b>22 Creole</b>	<b>322</b>
22.1 Emphasized text . . . . .	322
22.2 Lists . . . . .	322
22.3 Escape character . . . . .	323
22.4 Horizontal lines . . . . .	323
22.5 Headings . . . . .	324
22.6 Legacy HTML . . . . .	324
22.7 Code . . . . .	325
22.8 Table . . . . .	326
22.8.1 Create a table . . . . .	326
22.8.2 Add color on rows or cells . . . . .	327
22.8.3 Add color on border and text . . . . .	327
22.8.4 No border or same color as the background . . . . .	327
22.8.5 Bold header or not . . . . .	328
22.9 Tree . . . . .	328
22.10 Special characters . . . . .	330
22.11 OpenIconic . . . . .	330
22.12 Appendix: Examples of "Creole List" on all diagrams . . . . .	331
22.12.1 Activity . . . . .	331
22.12.2 Class . . . . .	332
22.12.3 Component, Deployment, Use-Case . . . . .	333
22.12.4 Gantt project planning . . . . .	334
22.12.5 Object . . . . .	334
22.12.6 MindMap . . . . .	335
22.12.7 Network (nwdiag) . . . . .	335
22.12.8 Note . . . . .	335
22.12.9 Sequence . . . . .	336
22.12.10 State . . . . .	336
22.13 Appendix: Examples of "Creole horizontal lines" on all diagrams . . . . .	336
22.13.1 Activity . . . . .	336
22.13.2 Class . . . . .	337
22.13.3 Component, Deployment, Use-Case . . . . .	338
22.13.4 Gantt project planning . . . . .	339
22.13.5 Object . . . . .	339
22.13.6 MindMap . . . . .	339
22.13.7 Network (nwdiag) . . . . .	340
22.13.8 Note . . . . .	340
22.13.9 Sequence . . . . .	341
22.13.10 State . . . . .	341
22.14 Style equivalent (between Creole and HTML) . . . . .	341
<b>23 Defining and using sprites</b>	<b>343</b>
23.1 Changing colors . . . . .	344
23.2 Encoding Sprite . . . . .	344



23.3 Importing Sprite . . . . .	344
23.4 Examples . . . . .	344
23.5 StdLib . . . . .	345
23.6 Listing Sprites . . . . .	345
<b>24 Skinparam command</b>	<b>347</b>
24.1 Usage . . . . .	347
24.2 Nested . . . . .	347
24.3 Black and White . . . . .	347
24.4 Shadowing . . . . .	348
24.5 Reverse colors . . . . .	348
24.6 Colors . . . . .	349
24.7 Font color, name and size . . . . .	350
24.8 Text Alignment . . . . .	350
24.9 Examples . . . . .	351
24.10 List of all skinparam parameters . . . . .	354
<b>25 Preprocessing</b>	<b>358</b>
25.1 Migration notes . . . . .	358
25.2 Variable definition . . . . .	358
25.3 Boolean expression . . . . .	359
25.3.1 Boolean representation [0 is false] . . . . .	359
25.3.2 Boolean operation and operator [&&,   , ()] . . . . .	359
25.3.3 Boolean builtin functions [%false(), %true(), %not(<exp>)] . . . . .	359
25.4 Conditions [!if, !else, !elseif, !endif] . . . . .	359
25.5 While loop [!while, !endwhile] . . . . .	360
25.6 Procedure [!procedure, !endprocedure] . . . . .	361
25.7 Return function [!function, !endfunction] . . . . .	362
25.8 Default argument value . . . . .	363
25.9 Unquoted procedure or function [!unquoted] . . . . .	364
25.10 Keywords arguments . . . . .	364
25.11 Including files or URL [!include, !include_many, !include_once] . . . . .	365
25.12 Including Subpart [!startsub, !endsub, !includesub] . . . . .	366
25.13 Builtin functions [%] . . . . .	366
25.14 Logging [!log] . . . . .	367
25.15 Memory dump [!memory_dump] . . . . .	367
25.16 Assertion [!assert] . . . . .	368
25.17 Building custom library [!import, !include] . . . . .	368
25.18 Search path . . . . .	369
25.19 Argument concatenation [##] . . . . .	369
25.20 Dynamic invocation [%invoke_procedure(), %call_user_func()] . . . . .	369
25.21 Evaluation of addition depending of data types [+] . . . . .	370
25.22 Preprocessing JSON . . . . .	371
<b>26 Unicode</b>	<b>372</b>
26.1 Examples . . . . .	372
26.2 Charset . . . . .	374
<b>27 Standard Library</b>	<b>375</b>
27.1 List of Standard Library . . . . .	375
27.2 ArchiMate [archimate] . . . . .	376
27.3 AWS library [aws] . . . . .	377
27.4 Amazon Labs AWS Library [awslib] . . . . .	378
27.5 Azure library [azure] . . . . .	379
27.6 C4 Library [C4] . . . . .	380
27.7 Cloud Insight [cloudinsight] . . . . .	381
27.8 Cloudogu [cloudogu] . . . . .	382
27.9 Elastic library [elastic] . . . . .	383
27.10 Google Material Icons [material] . . . . .	385



27.11Kubernetes [kubernetes] . . . . .	386
27.12Logos [logos] . . . . .	387
27.13Office [office] . . . . .	389
27.14Open Security Architecture (OSA) [osa] . . . . .	391
27.15Tupadr3 library [tupadr3] . . . . .	393

