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PlantUML > Language specification > Timing Diagram >

sponsors 20 patreon 122 liberapay 10 paypal 296



# Timing Diagram

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

## Declaring element or participant

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

Keyword	Description
analog	An <code>analog</code> signal is continuous, and the values are linearly interpolated between the given setpoints
binary	A <code>binary</code> signal restricted to only 2 states
clock	A <code>clocked</code> signal that repeatedly transitions from high to low, with a <code>period</code> , and an optional <code>pulse</code> and <code>offset</code>
concise	A simplified <code>concise</code> signal designed to show the movement of data (great for messages)
robust	A <code>robust</code> complex line signal designed to show the transition from one state to another (can have many states)

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
```

- Declaring element or participant
- Binary and Clock
- Adding message
- Relative time
- Anchor Points
- Participant oriented
- Setting scale
- Initial state
- Intricated state
- Hidden state
- Hide time axis
- Using Time and Date
- Adding constraint
- Highlighted period
- Using notes
- Adding texts
- Complete example
- Digital Example
- Adding color
- Using (global) style
- Applying Colors to specific lines
- Compact mode

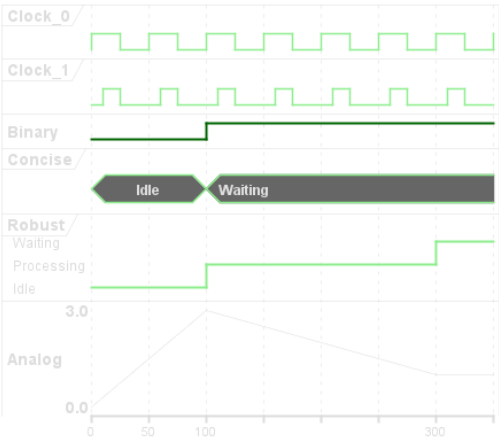
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```
clock "Clock_0" as C0 with period 50
clock "Clock_1" as C1 with period 50 pulse 15
binary "Binary" as B
concise "Concise" as C
robust "Robust" as R
analog "Analog" as A

@0
C is Idle
R is Idle
A is 0

@100
B is high
C is Waiting
R is Processing
A is 3

@300
R is Waiting
A is 1
@enduml
```



[Ref: [QA-14631](#), [QA-14647](#) and [QA-11288](#)]

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
```



Adding message

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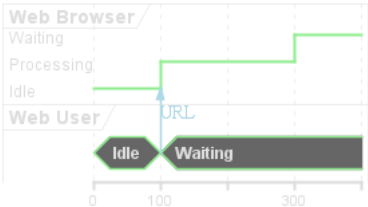


```
@startuml
robust "Web Browser" as WB
concise "Web User" as WU

@0
WU is Idle
WB is Idle

@100
WU -> WB : URL
WU is Waiting
WB is Processing

@300
WB is Waiting
@enduml
```



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

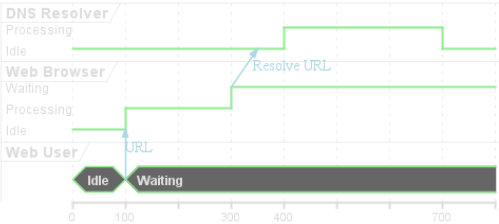
@0
WU is Idle
WB is Idle
DNS is Idle

@+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
```



Anchor Points

Instead of using absolute or relative time on an absolute time you can define a time as an anchor point by using the as keyword and starting the name with a : .

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```
@startuml
clock clk with period 1
binary "enable" as EN
concise "dataBus" as db

@0 as :start
@5 as :en_high
@10 as :en_low
@:en_high-2 as :en_highMinus2

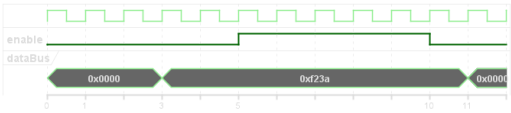
@:start
EN is low
db is "0x0000"

@:en_high
EN is high

@:en_low
EN is low

@:en_highMinus2
db is "0xf23a"

@:en_high+6
db is "0x0000"
@enduml
```



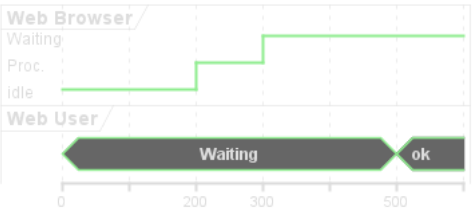
### Participant oriented

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
```



### Setting scale

You can also set a specific scale.

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```
concise "Web User" as WU
scale 100 as 50 pixels

@WU
0 is Waiting
+500 is ok
@enduml
```



When using absolute Times/Dates, 1 "tick" is equivalent to 1 second.

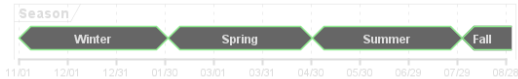
```
@startuml
concise "Season" as S
'30 days is scaled to 50 pixels
scale 2592000 as 50 pixels

@2000/11/01
S is "Winter"

@2001/02/01
S is "Spring"

@2001/05/01
S is "Summer"

@2001/08/01
S is "Fall"
@enduml
```



Initial state

You can also define an inital state.

```
@startuml
robust "Web Browser" as WB
concise "Web User" as WU

WB is Initializing
WU is Absent

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

@WU
0 is Waiting
+500 is ok
@enduml
```

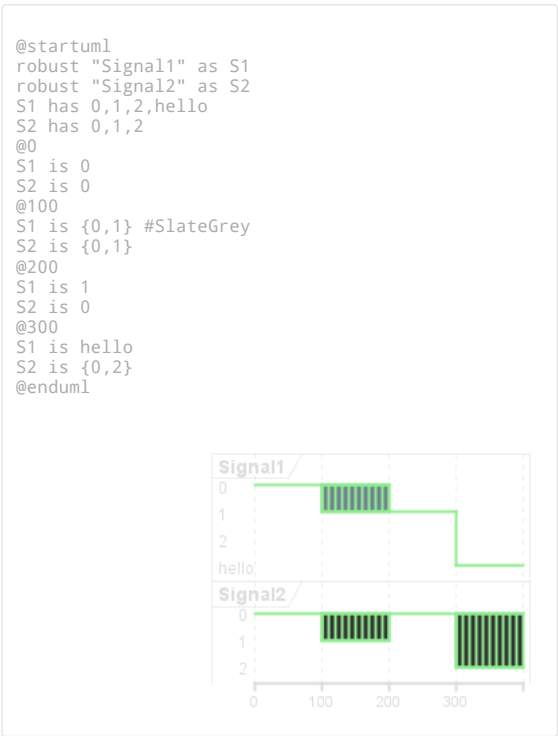


Intricated state

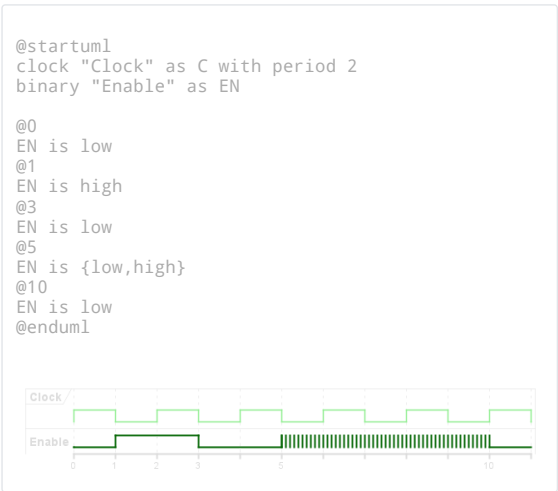
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Intricated or undefined robust state



Intricated or undefined binary state



[Ref: [QA-11936](#) and [QA-15933](#)]

Hidden state

It is also possible to hide some state.

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concise "Web User" as WU

```
@0
WU is {-}

@100
WU is A1

@200
WU is {-}

@300
WU is {hidden}

@400
WU is A3

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



```
@startuml
scale 1 as 50 pixels

concise state0
concise substate1
robust bit2

bit2 has HIGH,LOW

@state0
0 is 18_start
6 is s_dPause
8 is 10_data
14 is {hidden}

@substate1
0 is sSeq
4 is sPause
6 is {hidden}
8 is dSeq
12 is dPause
14 is {hidden}

@bit2
0 is HIGH
2 is LOW
4 is {hidden}
8 is HIGH
10 is LOW
12 is {hidden}
@enduml
```



[Ref. [QA-12222](#)]

### Hide time axis

It is possible to hide time axis.

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```
hide time-axis
concise "Web User" as WU

WU is Absent

@WU
0 is Waiting
+500 is ok
@enduml
```



Using Time and Date

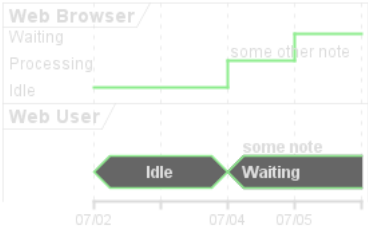
It is possible to use time or date.

```
@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
```

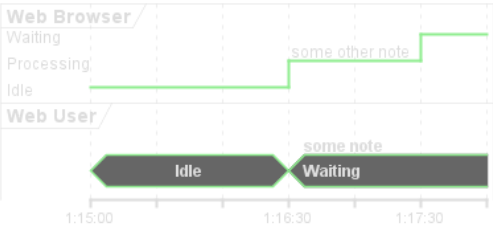


```
@startuml
robust "Web Browser" as WB
concise "Web User" as WU

@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
```





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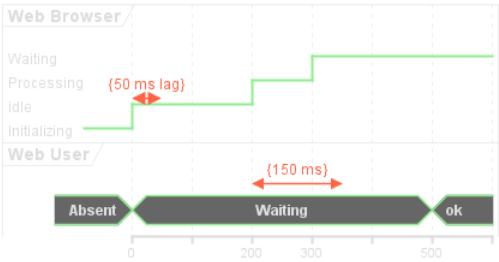
It is possible to display time constraints on the diagrams.

```
@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
```



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

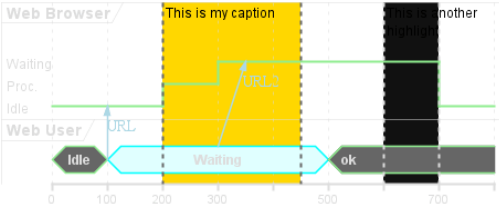
@200
WB is Proc.

@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
highlight 600 to 700 : This is another\nhighlight
@enduml
```



[Ref. QA-10868]

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### Using notes

You can use the `note top of` and `note bottom of` keywords to define notes related to a single object or participant (*available only for concise `object`*).

```
@startuml
robust "Web Browser" as WB
concise "Web User" as WU

@0
WU is Idle
WB is Idle

@100
WU is Waiting
WB is Processing
note top of WU : first note\non several\nlines
note bottom of WU : second note\non several\nlines

@300
WB is Waiting
@enduml
```

[Ref. [QA-6877](#)]

### Adding texts

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

Diagram title

Diagram header

Diagram footer

Diagram legend

Diagram caption

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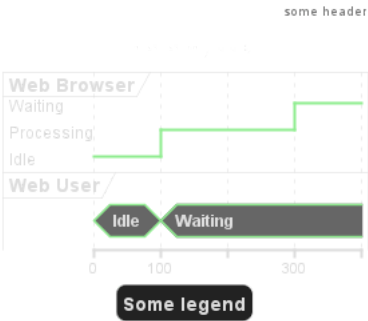
```
Title This is my title
header: some header
footer: some footer
legend
Some legend
end legend
caption some caption

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
```



Complete example

Thanks to [Adam Rosien](#) for this example.

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последовательность прецедентов классов активности активности **UML** компонент

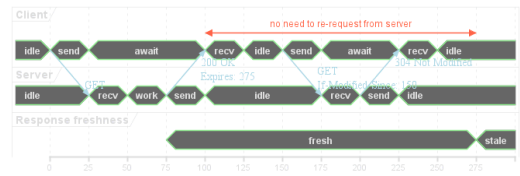
```
concise "Client" as Client
concise "Server" as Server
concise "Response freshness" as Cache

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
```



Digital Example

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```
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

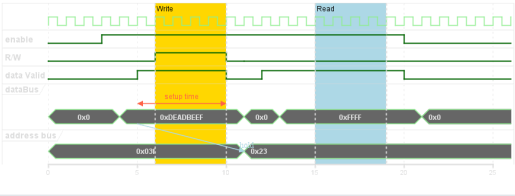
@:write_end
rw is low
dv is low
@:write_end+1
rw is low
db is "0x0"
addr is "0x23"

@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
```



Adding color

You can add [color](#).



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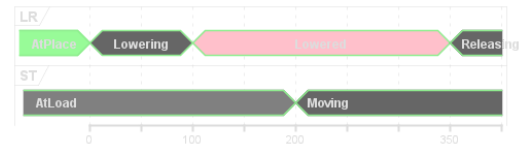


```
concise "LR" as LR
concise "ST" as ST

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](#)]

Using (global) style

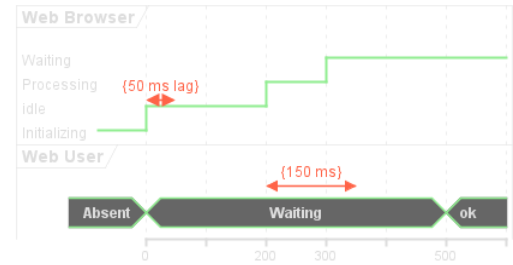
Without style (by default)

```
@startuml
robust "Web Browser" as WB
concise "Web User" as WU

WB is Initializing
WB 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
```



With style

You can use [style](#) to change rendering of elements.

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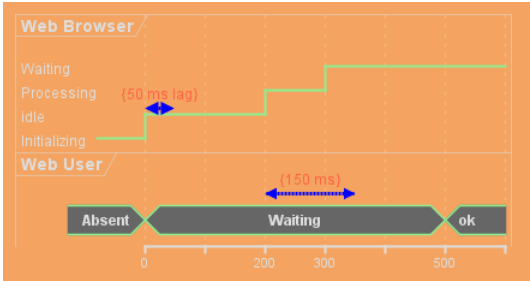


```
<style>
timingDiagram {
  document {
    BackGroundColor SandyBrown
  }
  constraintArrow {
    LineStyle 2-1
    LineThickness 3
    LineColor Blue
  }
}
</style>
robust "Web Browser" as WB
concise "Web User" as WU

WB is Initializing
WU is Absent

@WB
0 is idle
+200 is Processing
+100 is Waiting
WB@0 <-> @50 : {50 ms lag}

@WU
0 is Waiting
+500 is ok
@200 <-> @+150 : {150 ms}
@enduml
```



[Ref: [QA-14340](#)]

### Applying Colors to specific lines

You can use the `<style>` tags and stereotyping to give a name to line attributes.

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```
<style>
timingDiagram {
  .red {
    LineColor red
  }
  .blue {
    LineColor blue
    LineThickness 5
  }
}
</style>

clock clk with period 1
binary "Input Signal 1" as IS1
binary "Input Signal 2" as IS2 <<blue>>
binary "Output Signal 1" as OS1 <<red>>

@0
IS1 is low
IS2 is high
OS1 is low
@2
OS1 is high
@4
OS1 is low
@5
IS1 is high
IS2 is high
OS1 is high
@6
IS2 is low
@10
IS1 is low
OS1 is low
@enduml
```

[Ref. QA-15870]

### Compact mode

You can use `compact` command to compact the timing layout.

#### By default





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robust "Web Browser" as WB
concise "Web User" as WU
robust "Web Browser2" as WB2
```

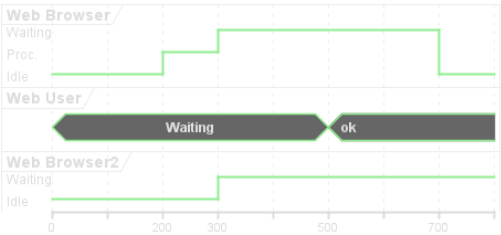
```
@0
WU is Waiting
WB is Idle
WB2 is Idle
```

```
@200
WB is Proc.
```

```
@300
WB is Waiting
WB2 is Waiting
```

```
@500
WU is ok
```

```
@700
WB is Idle
@enduml
```



Global mode with mode compact

```
@startuml
mode compact
robust "Web Browser" as WB
concise "Web User" as WU
robust "Web Browser2" as WB2
```

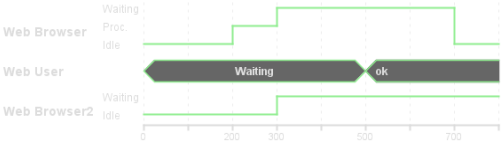
```
@0
WU is Waiting
WB is Idle
WB2 is Idle
```

```
@200
WB is Proc.
```

```
@300
WB is Waiting
WB2 is Waiting
```

```
@500
WU is ok
```

```
@700
WB is Idle
@enduml
```



Local mode with only compact on element

```
@startuml
mode compact
robust "Web Browser" as WB
concise "Web User" as WU
robust "Web Browser2" as WB2
```

```
@0
WU is Waiting
WB is Idle
WB2 is Idle
```

```
@200
WB is Proc.
```

```
@300
WB is Waiting
WB2 is Waiting
```

```
@500
WU is ok
```

```
@700
WB is Idle
@enduml
```



- В начало
- Что нового ?
- Быстрый старт
- Online Server
- Запуск
- F.A.Q.
- Скачать
- Форум
- Theme
- Препроцессинг
- Стандартная библиотека
- Hitchhiker's Guide
- PDF Guide



```
compact robust "Web Browser" as WB
compact concise "Web User" as WU
robust "Web Browser2" as WB2
```

```
@0
WU is Waiting
WB is Idle
WB2 is Idle
```

```
@200
WB is Proc.
```

```
@300
WB is Waiting
WB2 is Waiting
```

```
@500
WU is ok
```

```
@700
WB is Idle
@enduml
```



[Ref. [QA-11130](#)]