Plant UML

PlantUML 은 다이어그램을 빠르게 작성하기 위한 오픈 소스 프로젝트입니다.

Timing 다이어그램

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

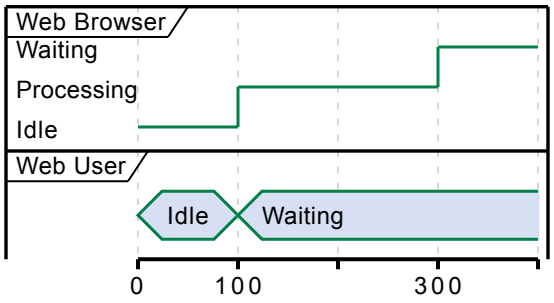
Declaring element or participant

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

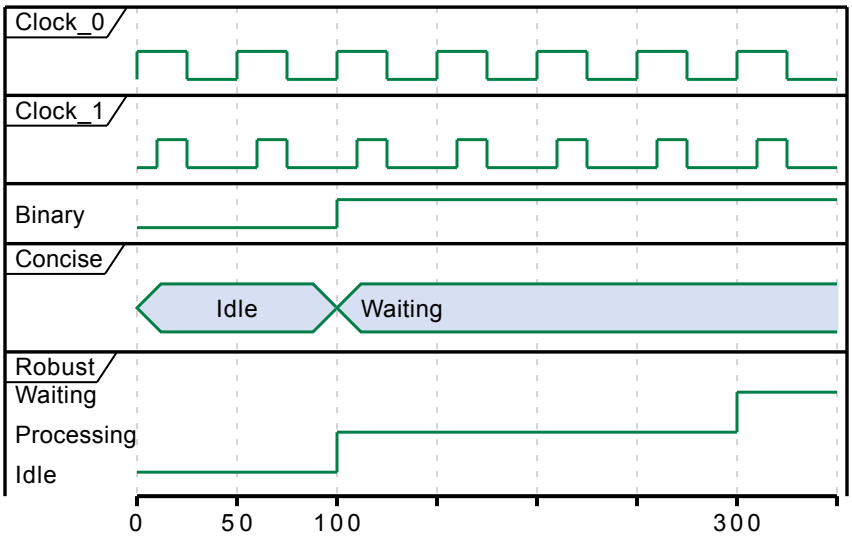
Keyword	Description
`concise`	A simplified signal designed to show the movement of data (great for messages)
`robust`	A complex line signal designed to show the transition from one state to another (can have many states)
`clock`	A clocked signal that repeatedly transitions from high to low, with a `period`, and an optional `pulse` and `offset`
`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
```



```
@startuml
clock   "Clock_0"   as C0 with period 50
clock   "Clock_1"   as C1 with period 50 pulse 15 offset 10
binary  "Binary"  as B
concise "Concise" as C
robust  "Robust"  as R


@0
C is Idle
R is Idle

@100
B is high
C is Waiting
R is Processing

@300
R is Waiting
@enduml
```

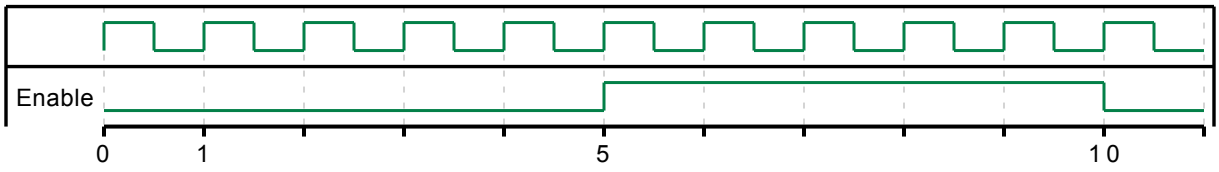


Binary and Clock

It's also possible to have binary and clock signal, using the following keywords:

- `binary`
- `clock`

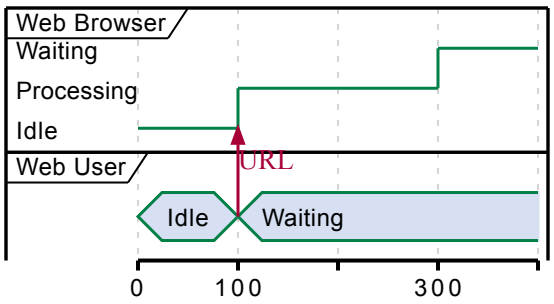
```
@startuml
clock clk with period 1
binary "Enable" as EN

@0
EN is low

@5
EN is high

@10
EN is low
@enduml
```



Adding message

You can add message using the following syntax.

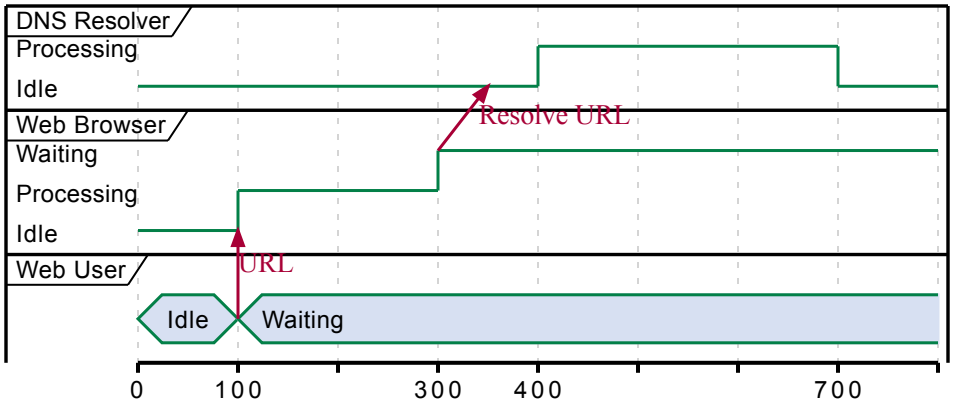
```
@startuml
robust "Web Browser" as WB
concise "Web User" as WU

@0
WU is Idle
WB is Idle

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

@300
WB is Waiting
@enduml
```



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
```

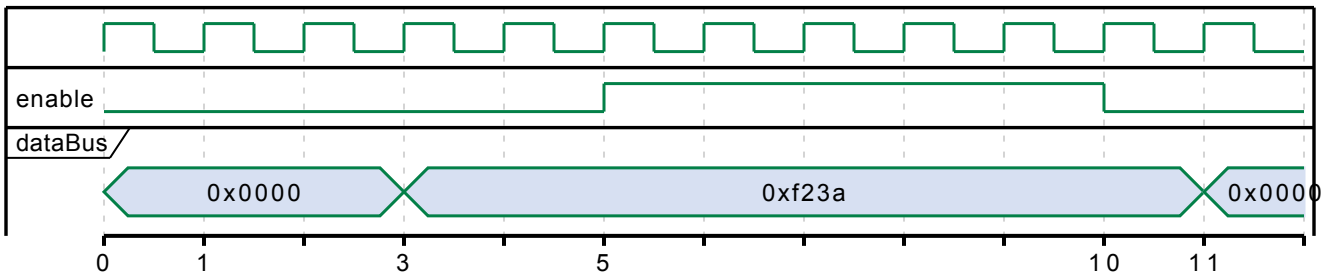


Anchor Points

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 :.

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

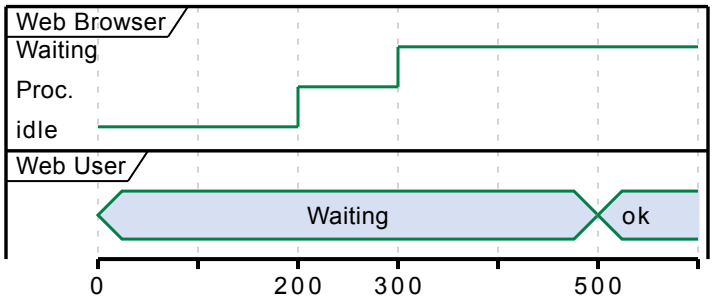
```
@startuml
clock clk with period 1
binary "enable" as EN
concise "dataBus" as db

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

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

@:en_high
EN is high

@:en_low
EN is low

@:en_highMinus2
db is "0xf23a"

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



Participant oriented

Rather than declare the diagram in chronological order, you can define it by participant.

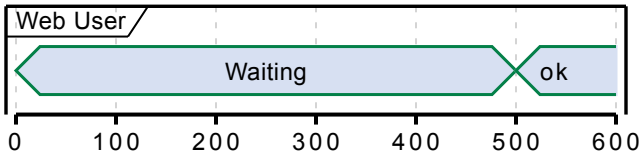
```
@startuml
robust "Web Browser" as WB
concise "Web User" as WU

@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.

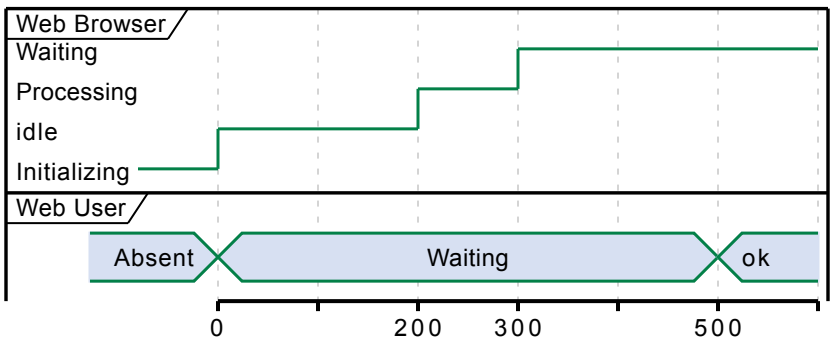
```
@startuml
concise "Web User" as WU
scale 100 as 50 pixels

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



Initial state

You can also define an inital state.

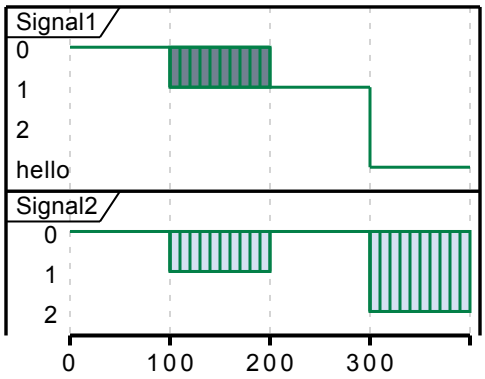
```
@startuml
robust "Web Browser" as WB
concise "Web User" as WU

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

A signal could be in some undefined state.

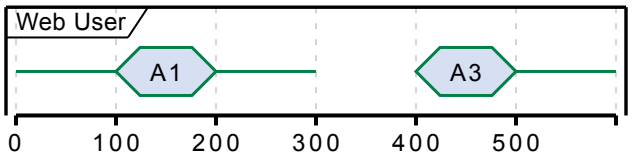
```
@startuml
robust "Signal1" as S1
robust "Signal2" as S2
S1 has 0,1,2,hello
S2 has 0,1,2
@0
S1 is 0
S2 is 0
@100
S1 is {0,1} #SlateGrey
S2 is {0,1}
@200
S1 is 1
S2 is 0
@300
S1 is hello
S2 is {0,2}
@enduml
```



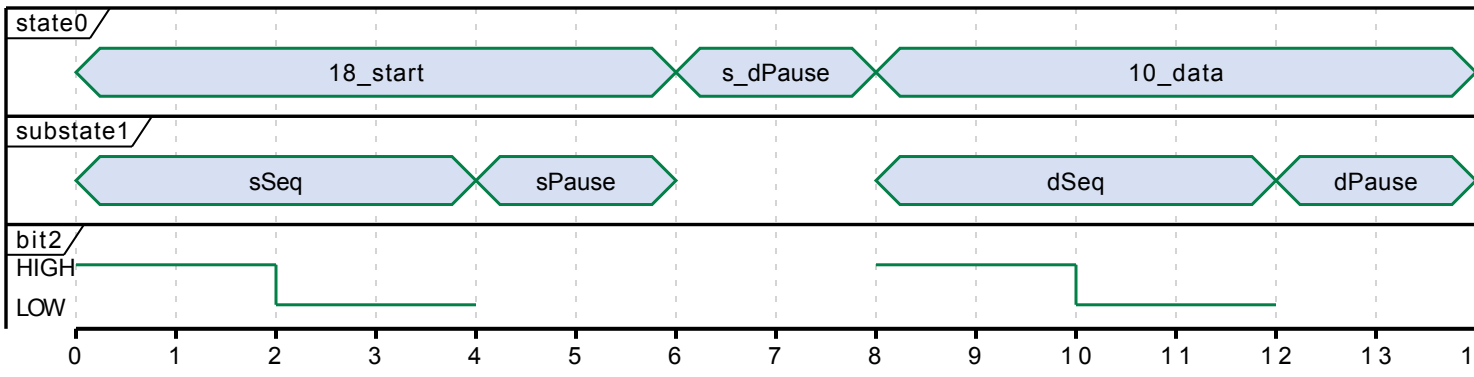
Hidden state

It is also possible to hide some state.

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

@0
WU is {-}

@100
WU is A1

@200
WU is {-}

@300
WU is {hidden}

@400
WU is A3

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



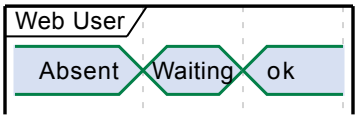
```
@startuml
scale 1 as 50 pixels

concise state0
concise substate1
robust bit2

bit2 has HIGH,LOW

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

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

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



Hide time axis

It is possible to hide time axis.

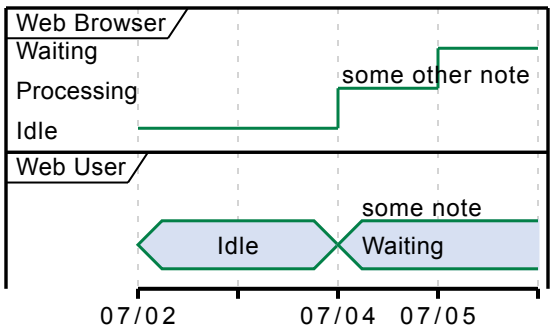
```
@startuml
hide time-axis
concise "Web User" as WU

WU is Absent

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



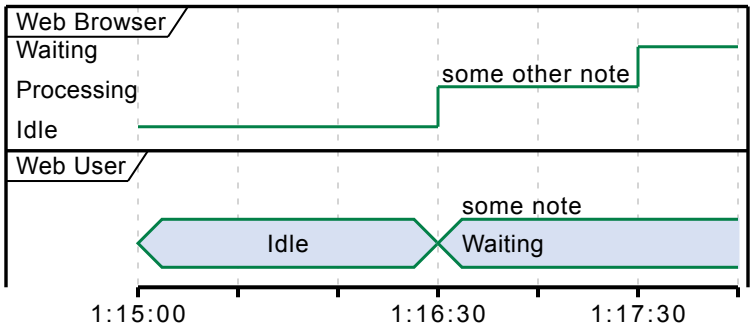
Using Time and Date

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
```



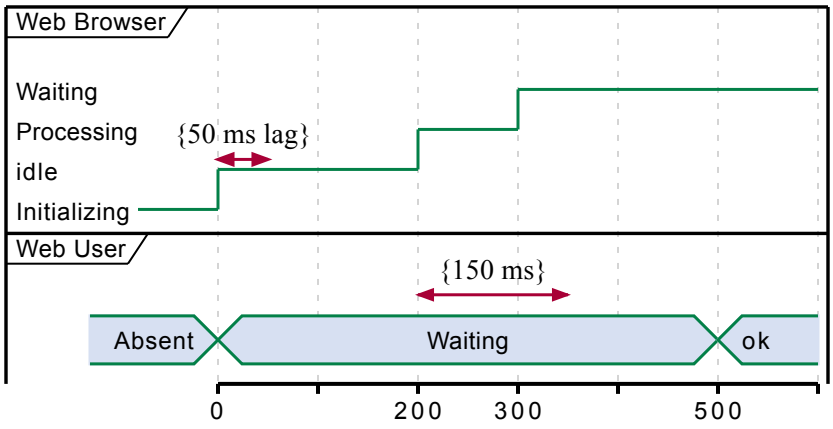

```
@startuml
robust "Web Browser" as WB
concise "Web User" as WU

@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
```



Adding constraint

It is possible to display time constraints on the diagrams.

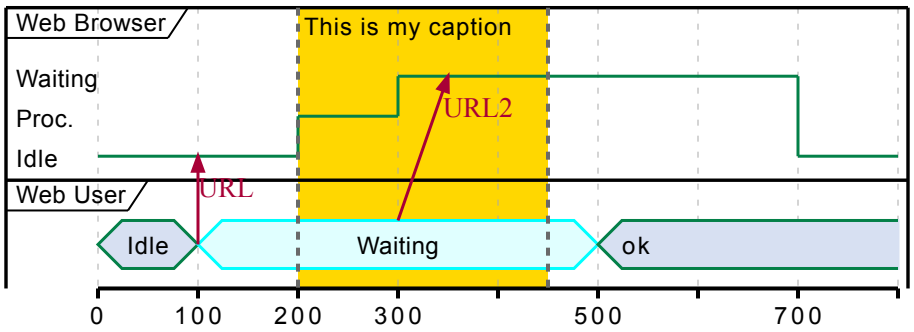
```
@startuml
robust "Web Browser" as WB
concise "Web User" as WU

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
```



Highlighted period

You can higlight a part of diagram.

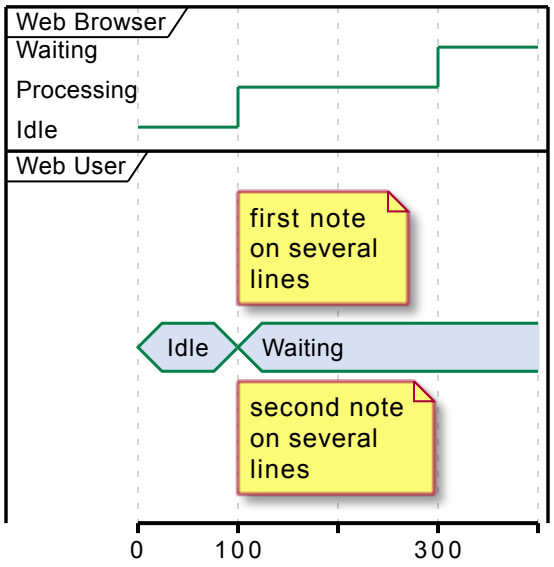
```
@startuml
robust "Web Browser" as WB
concise "Web User" as WU

@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
```



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)*.

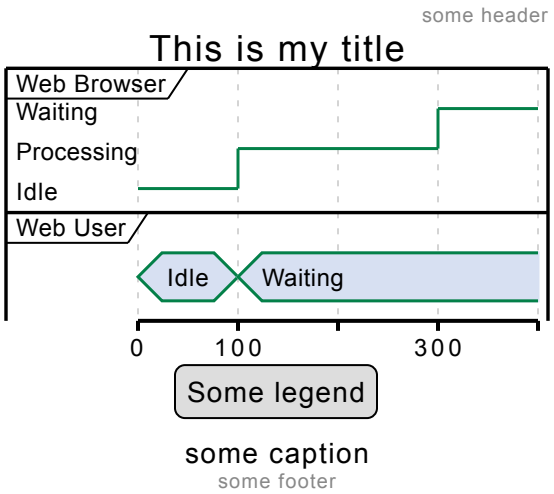
```
@startuml
robust "Web Browser" as WB
concise "Web User" as WU

@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
```



Adding texts

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

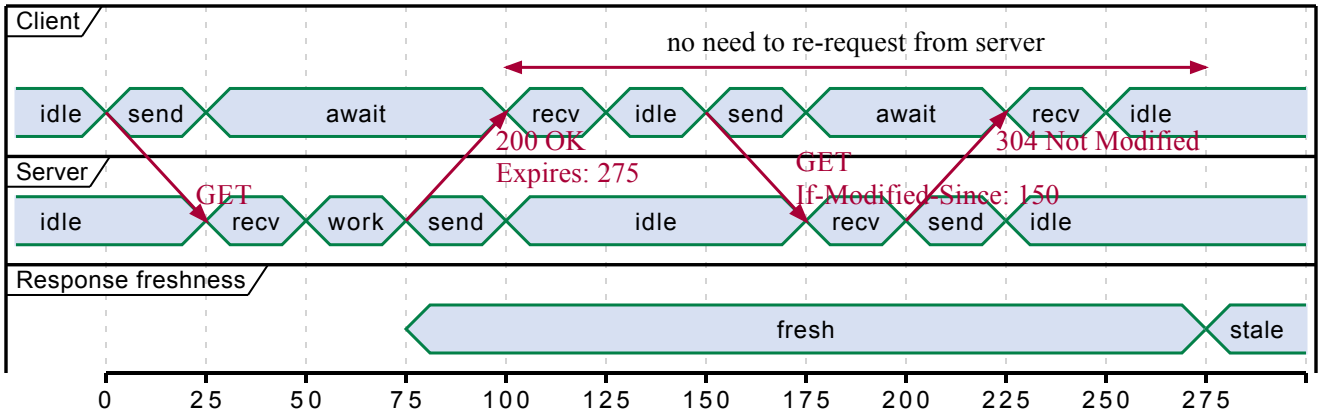
```
@startuml
Title This is my title
header: some header
footer: some footer
legend
Some legend
end legend
caption some caption

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
```



Complete example

Thanks to Adam Rosien for this example.

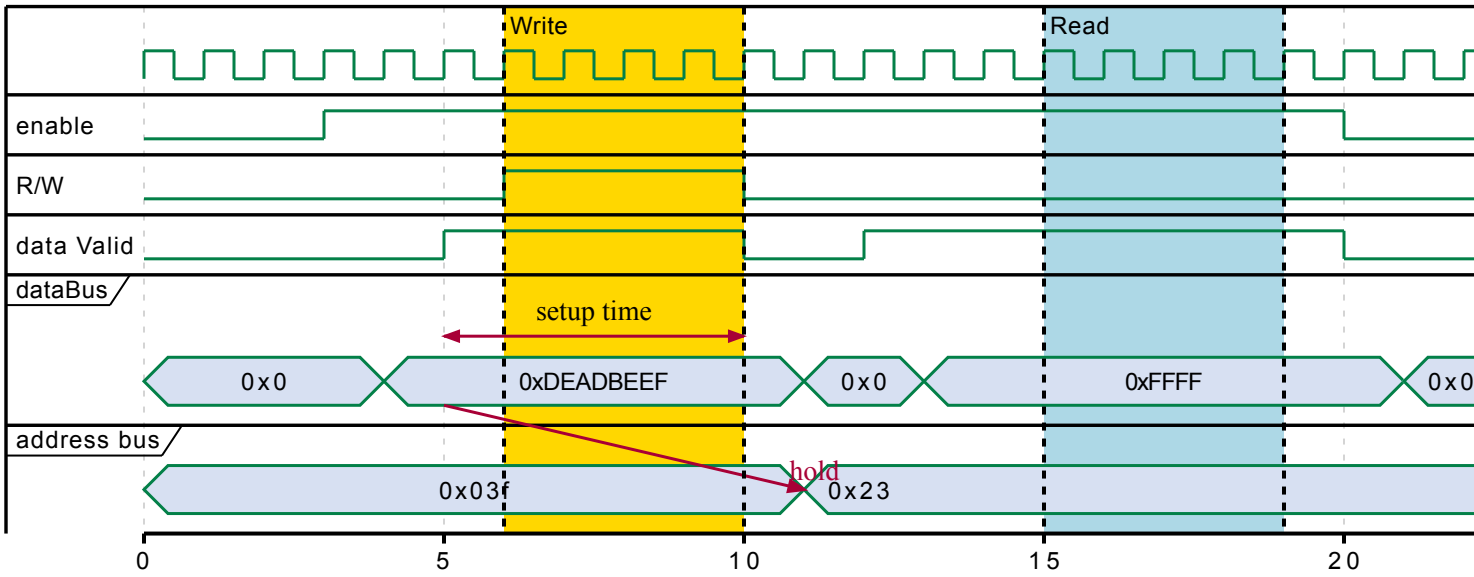
```
@startuml
concise "Client" as Client
concise "Server" as Server
concise "Response freshness" as Cache

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
```


Client
no need to re-request from server
idle
send
await
recv
idle
send
await
recv
idle
200 OK
Expires: 275
304 Not Modified
Server
GET
GET
If-Modified-Since: 150
idle
recv
work
send
idle
recv
send
idle
Response freshness
fresh
stale
0
25
50
75
100
125
150
175
200
225
250
275

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"
```

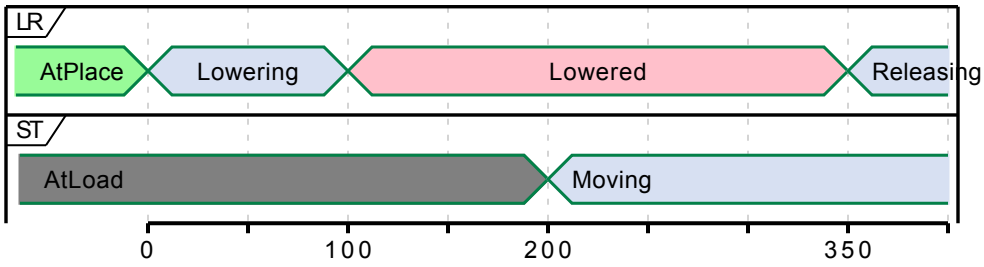
```
@20
en is low
dv is low
@21
db is "0x0"

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
```



Adding color

You can add color.

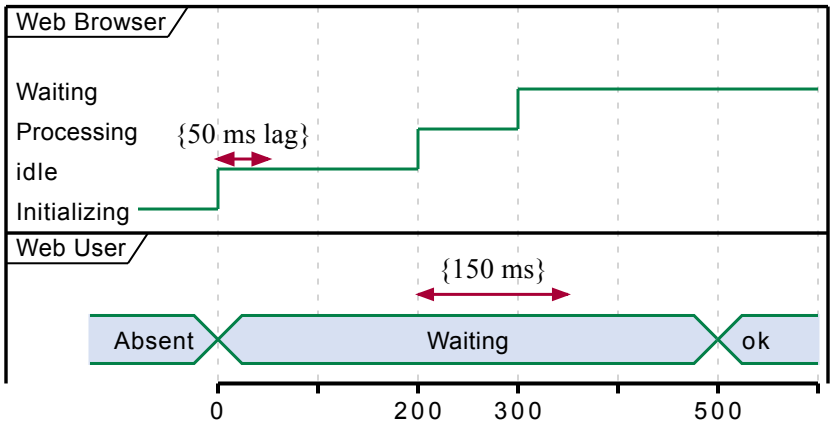
```
@startuml
concise "LR" as LR
concise "ST" as ST

LR is AtPlace #palegreen
ST is AtLoad #gray

@LR
0 is Lowering
100 is Lowered #pink
350 is Releasing

@ST
200 is Moving
@enduml
```



Using (global) style

Without style *(by default)*

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

WB is Initializing
WU is Absent

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

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



With style

You can use style to change rendering of elements.

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

WB is Initializing
WU is Absent

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

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