Structure (2A)

- Configuration

Please send corrections (or suggestions) to youngwlim@hotmail.com.

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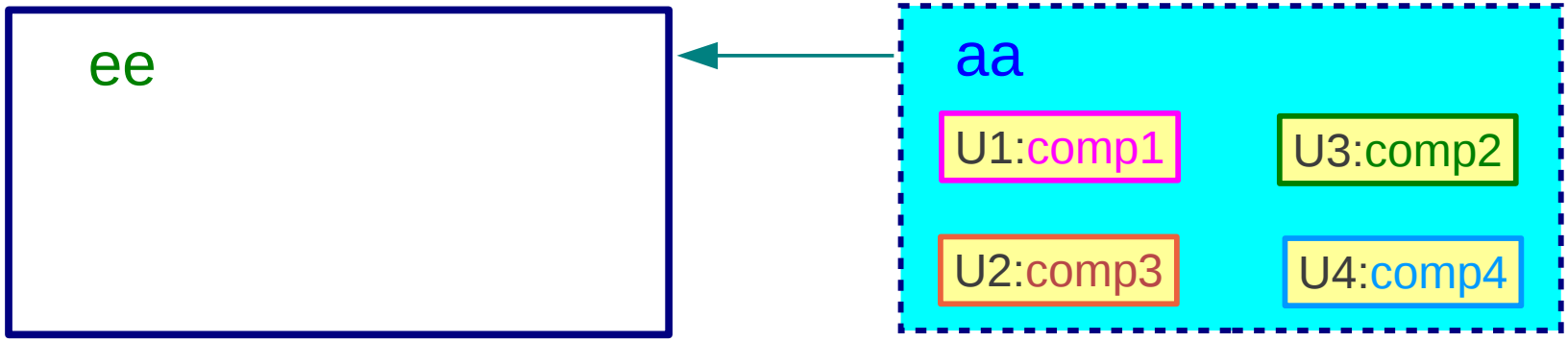
Structural Hierarchy



Component Declaration

```
component comp1 is
        port (        );
end comp1;

component comp2 is
        port (        );
end comp2;

component comp3 is
        port (        );
end comp3;

component comp4 is
        port (        );
end comp4;
```

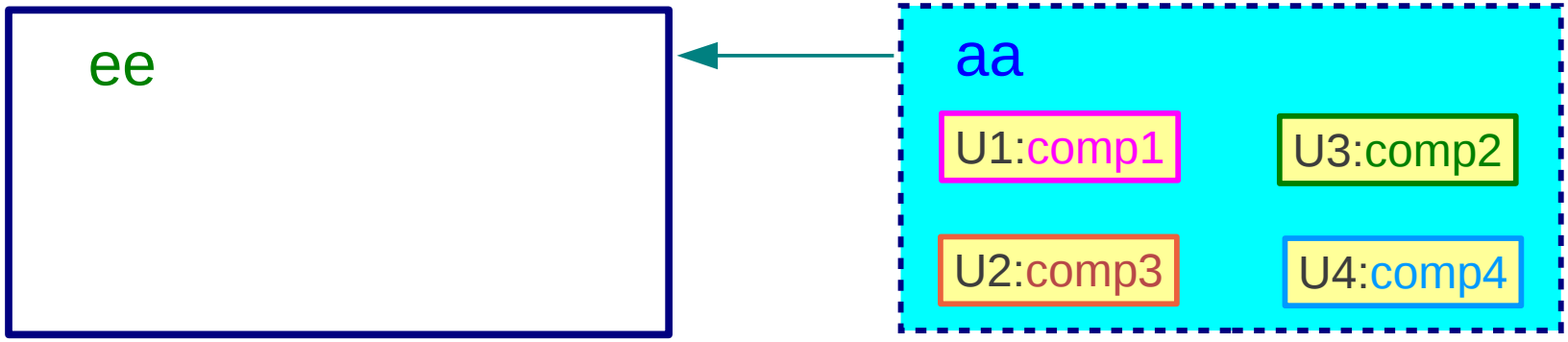
```
architecture aa of ee is

begin
```

Component Instantiation

```
U1: comp1 port map (      );
U2: comp2 port map (      );
U3: comp3 port map (      );
U4: comp4 port map (      );
```

```
end aa;
```

Which Entity – Architecture pairs?



- *Default Binding*
- *Configuration Specification*
- *Configuration Declaration*
  - *Default Configuration*
  - *Component Configuration*
    - *entity-architecture configuration*
    - *low level configuration*
  - *Block Configuration*

architecture aa **of** ee **is**

begin

Component Instantiation

```
U1: comp1 port map (      );
U2: comp2 port map (      );
U3: comp3 port map (      );
U4: comp4 port map (      );
```

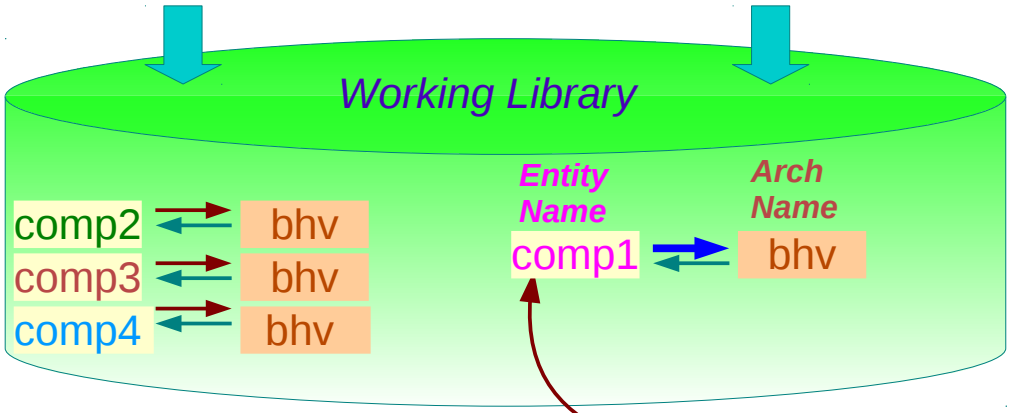
end aa;

Default Binding

```
entity comp1 is
      port (       );
end comp1;

entity comp2 is
      port (       );
end comp2;

entity comp3 is
      port (       );
end comp3;

entity comp4 is
      port (       );
end comp4;
```

```
architecture bhv of  comp1 is
      . . .
end comp1;

architecture bhv of comp2 is
      . . .
end comp2;

architecture bhv of comp3 is
      . . .
end comp3;

architecture bhv of comp4 is
      . . .
end comp4;
```

```
architecture aa of ee is


begin
        Component
        Name
    U1: comp1 port map (      );
    U2: comp2 port map (      );
    U3: comp3 port map (      );
    U4: comp4 port map (      );


end aa;
```



Component – Entity Binding

Component Name = Entity Name

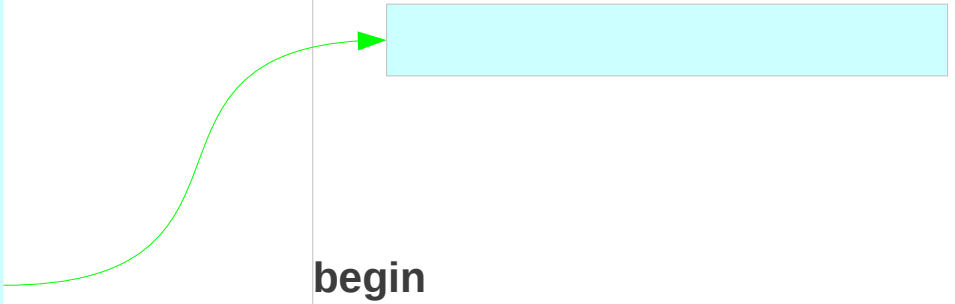
Entity – Architecture Binding

Last compiled Architecture

Configuration Specification (1)

Component Declaration

```
component comp1 is
        port (        );
end comp1;

component comp2 is
        port (        );
end comp2;

component comp3 is
        port (        );
end comp3;

component comp4 is
        port (        );
end comp4;
```



```
architecture aa of ee is

begin

        Component Instantiation
        U1: comp1 port map (      );
        U2: comp2 port map (      );
        U3: comp3 port map (      );
        U4: comp4 port map (      );

end aa;
```

Configuration Specification :
For each component instance,
Specify the selection of

- ***Entity declaration and***
- ***Architecture body.***

Configuration Specification (2)

Component Declaration

```
component comp1 is
        port (        );
end comp1;

component comp2 is
        port (        );
end comp2;

component comp3 is
        port (        );
end comp3;

component comp4 is
        port (        );
end comp4;
```

Library Name *Entity Name* *Arch Name*

```
for   U1: comp1 use entity work.comp1(bhv);
for   U2: comp2 use entity work.comp2(bhv);
for   U3: comp3 use entity work.comp3(bhv);
for   U4: comp4 use entity work.comp4(bhv);
```

```
architecture aa of ee is

begin

end aa;
```

Component Instantiation

```
U1: comp1 port map (      );
U2: comp2 port map (      );
U3: comp3 port map (      );
U4: comp4 port map (      );
```

Component Name

Configuration Specification :
For each component instance,
Specify the selection of
- ***Entity declaration and***
- ***Architecture body.***

Configuration Declaration (1)

Component Declaration

```
component comp1 is
        port (          );
end comp1;

component comp2 is
        port (          );
end comp2;

component comp3 is
        port (          );
end comp3;

component comp4 is
        port (          );
end comp4;
```

```
architecture aa of ee is

        [                                ]

begin

        Component Instantiation

        U1: comp1 port map (      );
        U2: comp2 port map (      );
        U3: comp3 port map (      );
        U4: comp4 port map (      );



end aa;
```

A Configuration :
A Design Unit
complied separately
stored in a library
Recompilation
of the entire design
can be avoided

```
configuration conf3 of ee is
  for aa
      for   U1: comp1 * * * ;
      for   U2: comp2 * * * ;
      for   U3: comp3 * * * ;
      for   U4: comp4 * * * ;
  end for;
end conf1;
```

Configuration Declaration (2)

Component Declaration

```
component comp1 is
        port (        );
end comp1;

component comp2 is
        port (        );
end comp2;

component comp3 is
        port (        );
end comp3;

component comp4 is
        port (        );
end comp4;
```

```
architecture aa of ee is

begin

        Component Instantiation

        U1: comp1 port map (      );
        U2: comp2 port map (      );
        U3: comp3 port map (      );
        U4: comp4 port map (      );


end aa;
```

- *Default Configuration*
- *Component Configuration*
  - *entity-architecture configuration*
  - *low level configuration*
- *Block Configuration*

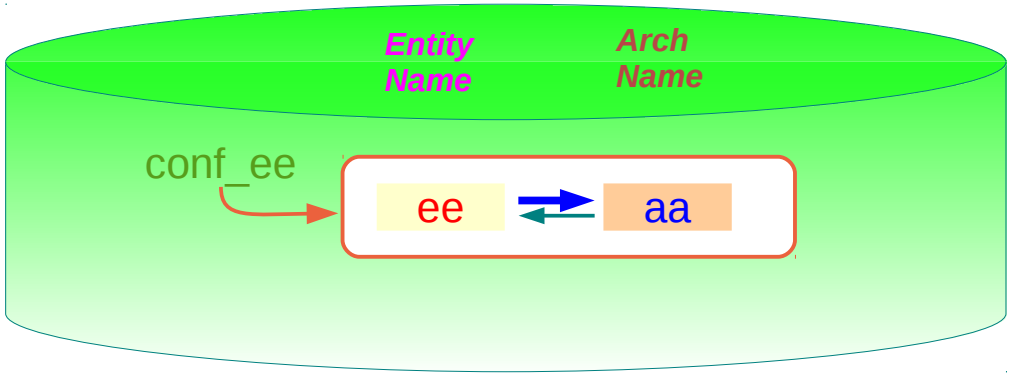
The configuration of an entity is
For a specific architecture specify
- ***Component Configuration***
- ***Block Configuration***

Default Configuration (1)

```
entity ee is
        port (          );
end ee;
```

```
architecture aa of ee is


begin
                Component
                Name
        U1: comp1 port map (      );
        U2: comp2 port map (      );
        U3: comp3 port map (      );
        U4: comp4 port map (      );


end aa;
```

default configuration of the entity ee




```
configuration conf_ee of ee is
        for aa
        end for;
end conf_ee;
```

The configuration of an entity is
For a specific architecture specify
- ***Component Configuration***
- ***Block Configuration***

Default Configuration:
No specific configuration
for any block or component

Default Binding

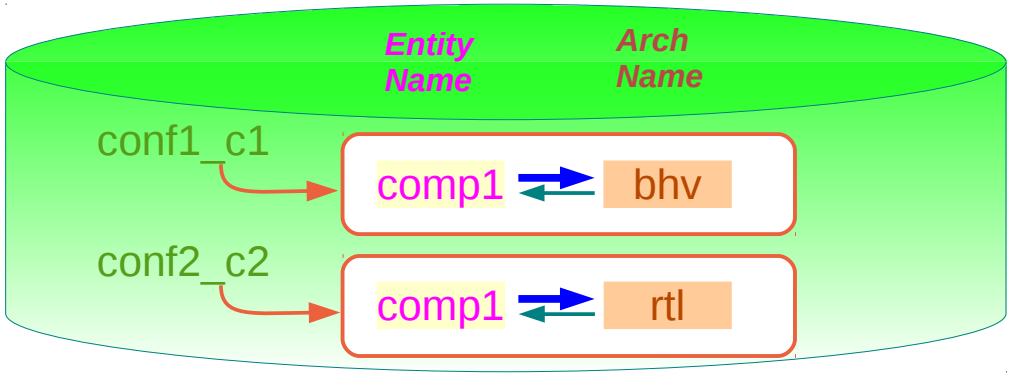
Default Configuration (2)

```
entity comp1 is
      port (       );
end comp1;
```

```
architecture bhv of comp1 is
        . . .
end comp1;
```

```
architecture rtl of comp1 is
        . . .
end comp1;
```

default configurations
of the entity comp1



The configuration of an entity is
For a specific architecture specify
- ***Component Configuration***
- ***Block Configuration***

Default Configuration:
No specific configuration
for any block or component

```
architecture aa of ee is


begin
```

Component Name

```
U1: comp1 port map (      );
U2: comp2 port map (      );
U3: comp3 port map (      );
U4: comp4 port map (      );
```

```
end aa;
```

```
configuration conf1_c1 of comp1 is
      for bhv
      end for;
end conf1;
```

```
configuration conf2_c1 of comp1 is
      for rtl
      end for;
end conf2;
```

Default Configuration (3)

```
entity comp1 is
        port (        );
end comp1;

entity comp2 is
        port (        );
end comp2;

entity comp3 is
        port (        );
end comp3;

entity comp4 is
        port (        );
end comp4;
```

```
architecture bhv of  comp1 is
        . . .
end comp1;

architecture bhv of comp2 is
        . . .
end comp2;

architecture bhv of comp3 is
        . . .
end comp3;

architecture bhv of comp4 is
        . . .
end comp4;
```

```
architecture aa of ee is


begin
        Component
        Name
    U1: comp1 port map (      );
    U2: comp2 port map (      );
    U3: comp3 port map (      );
    U4: comp4 port map (      );


end aa;
```

No Component Configuration
No Block Configuration

Use Default Binding

Entity Name	*Arch Name*
comp1	bhv
comp1	rtl

```
configuration conf1_c1 of comp1 is
        for bhv
        end for;
end conf1;
```

```
configuration conf2_c1 of comp1 is
        for rtl
        end for;
end conf2;
```

Component Configuration

Entity-Arch Configuration

Library Name *Entity Name* *Arch Name*

```
configuration conf3 of ee is
  for aa
      for  U1: comp1 use entity work.comp1(bhv);  end for;
      for  U2: comp2 use entity work.comp2(bhv);  end for;
      for  U3: comp3 use entity work.comp3(bhv);  end for;
      for  U4: comp4 use entity work.comp4(bhv);  end for;
  end for;
end conf1;
```

Low Level Configuration

Library Name *Conf Name*

```
configuration conf4 of ee is
  for aa
      for  U1: comp1 use configuration work.conf_c1;  end for;
      for  U2: comp2 use configuration work.conf_c2;  end for;
      for  U3: comp3 use configuration work.conf_c3;  end for;
      for  U4: comp4 use configuration work.conf_c4;  end for;
  end for;
end conf1;
```

- *Default Configuration*
- *Component Configuration*
  - *entity-architecture configuration*
  - *low level configuration*
- *Block Configuration*

Entity – Architecture Configuration

Component Declaration

```
component comp1 is
        port (          );
end comp1;

component comp2 is
        port (          );
end comp2;

component comp3 is
        port (          );
end comp3;

component comp4 is
        port (          );
end comp4;
```

```
architecture aa of ee is

begin

        Component Instantiation

        U1: comp1 port map (      );
        U2: comp2 port map (      );
        U3: comp3 port map (      );
        U4: comp4 port map (      );

end aa;
```

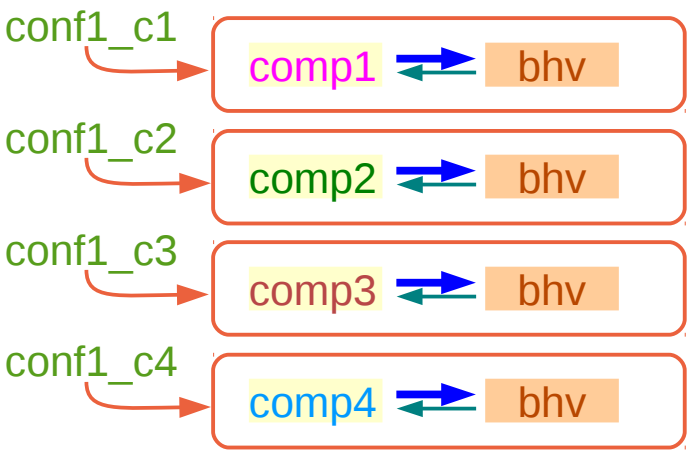
```
configuration conf_ea of ee is
  for aa
      for   U1: comp1 use entity work.comp1(bhv);  end for;
      for   U2: comp2 use entity work.comp2(bhv);  end for;
      for   U3: comp3 use entity work.comp3(bhv);  end for;
      for   U4: comp4 use entity work.comp4(bhv);  end for;
  end for;
end conf_ea;
```

Library Name *Entity Name* *Arch Name*

Low Level Configuration (1)

Component Declaration

```
component comp1 is
        port (          );
end comp1;
```

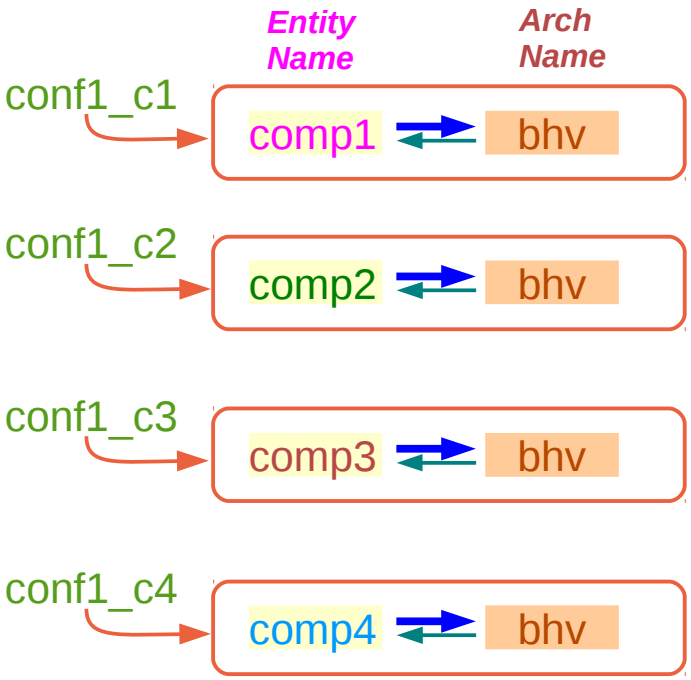



```
architecture aa of ee is

begin

        Component Instantiation
        U1: comp1 port map (      );
        U2: comp2 port map (      );
        U3: comp3 port map (      );
        U4: comp4 port map (      );

end aa;
```

```
configuration conf_ll of ee is
  for aa
      for  U1: comp1 use configuration work.conf1_c1;  end for;
      for  U2: comp2 use configuration work.conf1_c2;  end for;
      for  U3: comp3 use configuration work.conf1_c3;  end for;
      for  U4: comp4 use configuration work.con1f_c4;  end for;
  end for;
end conf_ll;
```

Library Name — *Configuration Name*

Low Level Configuration (2)



Configuration Name — Entity Name

Arc Name
```
configuration conf1_c1 of comp1 is
    for bhv    end for;
end conf1;
```

Arc Name
```
configuration conf1_c2 of comp2 is
    for bhv    end for;
end conf1;
```

Arc Name
```
configuration conf1_c3 of comp3 is
    for bhv    end for;
end conf1;
```

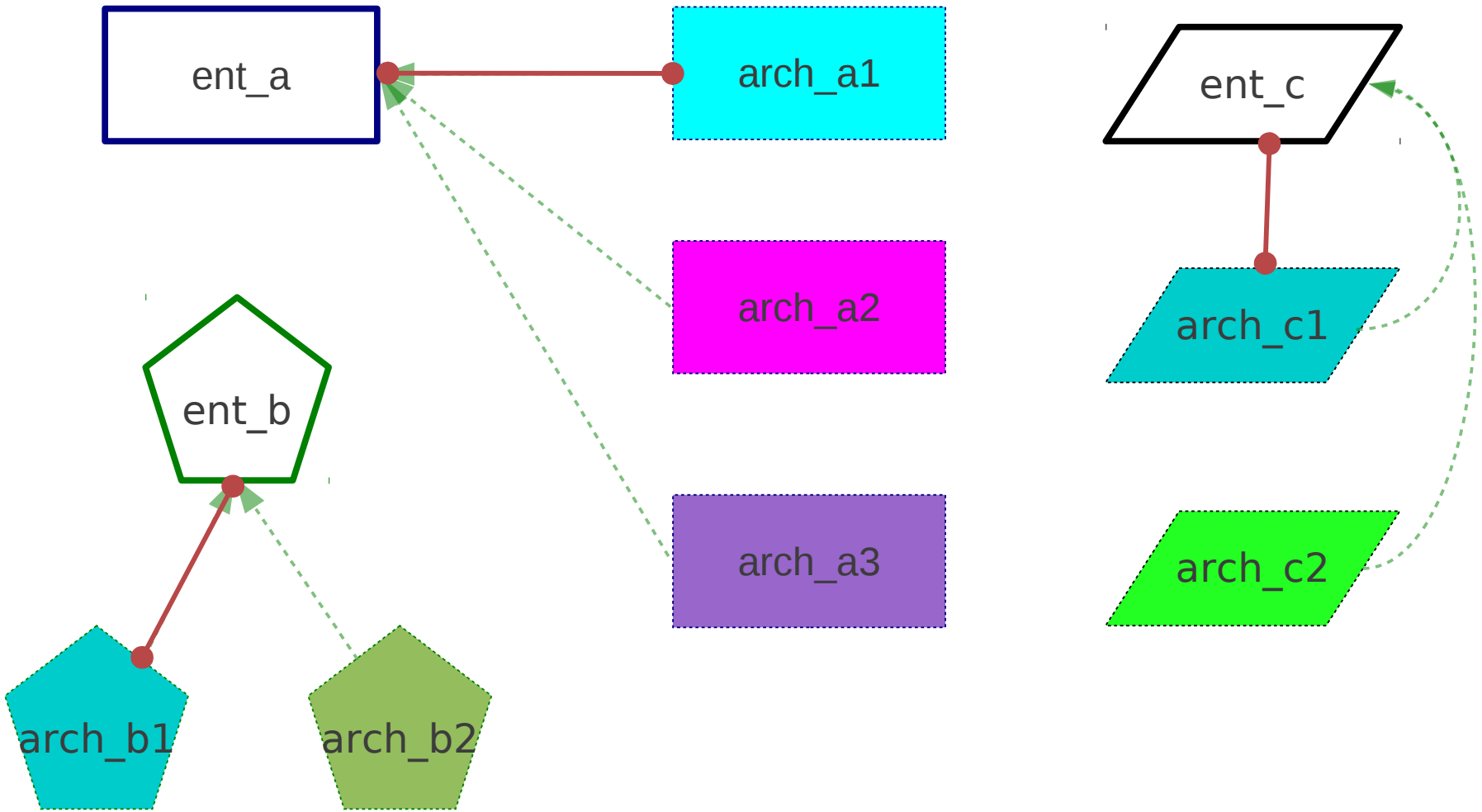
Arc Name
```
configuration conf1_c4 of comp4 is
    for bhv    end for;
end conf1;
```

```
configuration conf_ll of ee is
  for aa
      for  U1: comp1 use configuration work.conf1_c1;  end for;
      for  U2: comp2 use configuration work.conf1_c2;  end for;
      for  U3: comp3 use configuration work.conf1_c3;  end for;
      for  U4: comp4 use configuration work.con1f_c4;  end for;
  end for;
end conf_ll;
```

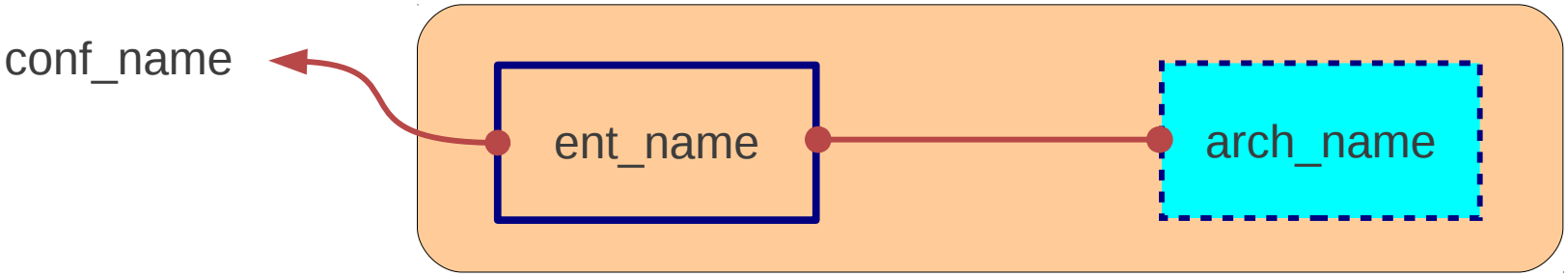
Library Name — Configuration Name

Sequential Assignment (1)

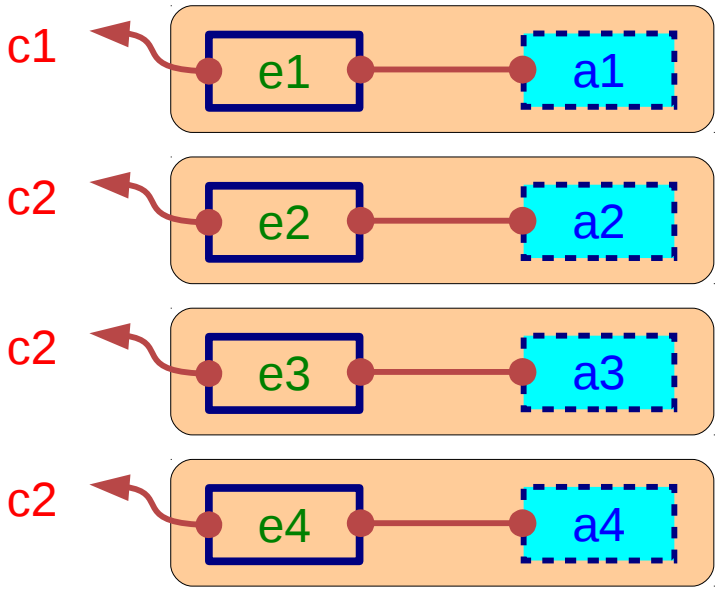
Entity – Architecture Binding



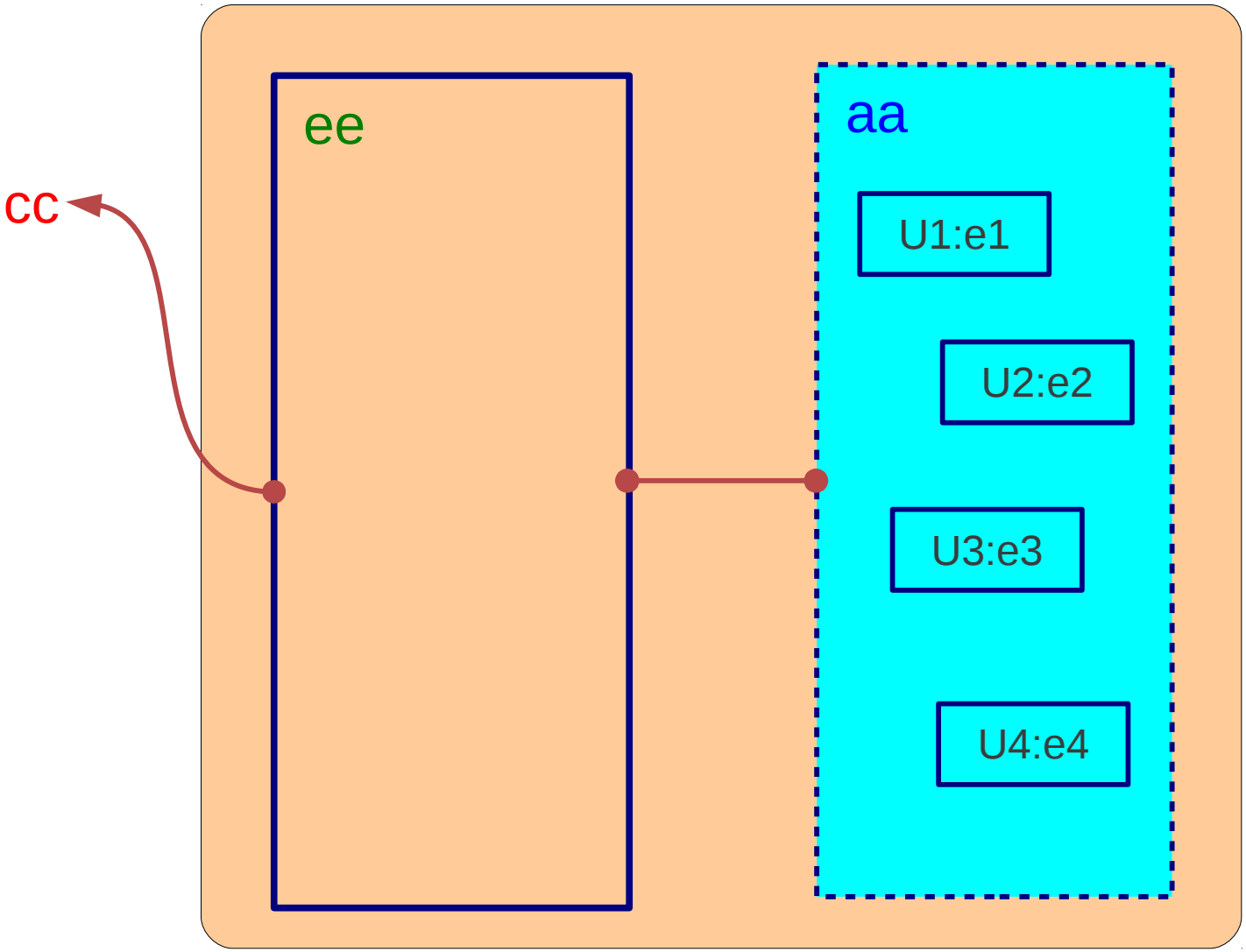
Configuration



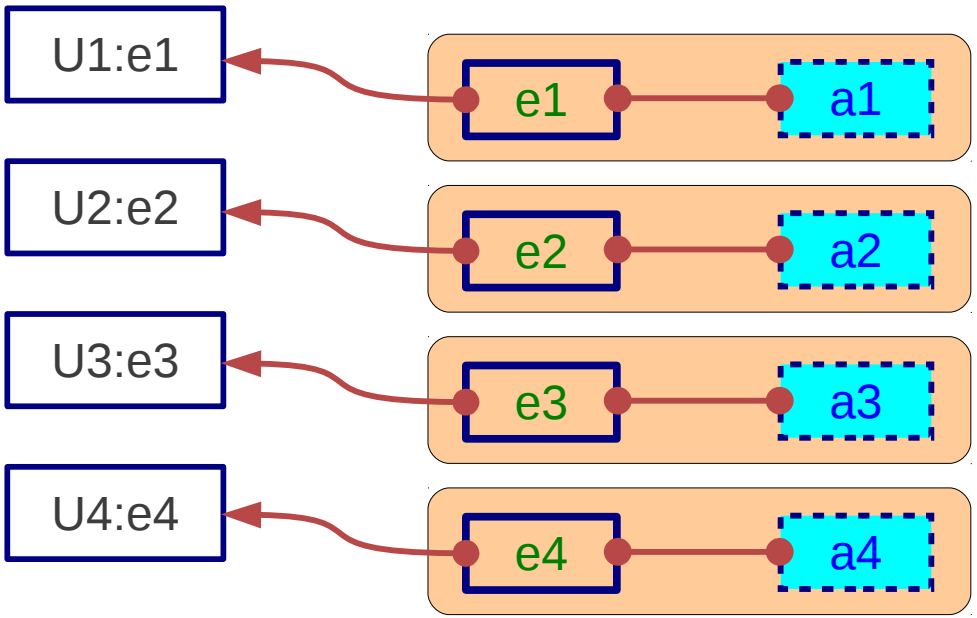
Configuration



Sequential Assignment (2)



Sequential Assignment (2)



Sequential Assignment (1)

Default Binding

Sequential Assignment (1)

Sequential Assignment (2)

Sequential Assignment (2)

References

[1] http://en.wikipedia.org/
[2] J. V. Spiegel, VHDL Tutorial,
http://www.seas.upenn.edu/~ese171/vhdl/vhdl_primer.html
[3] J. R. Armstrong, F. G. Gray, Structured Logic Design with VHDL
[4] Z. Navabi, VHDL Analysis and Modeling of Digital Systems
[5] D. Smith, HDL Chip Design
[6] http://www.csee.umbc.edu/portal/help/VHDL/stdpkg.html
[7] VHDL Tutorial - VHDL onlinewww.vhdl-online.de/tutorial/