**Software Engineering 1**

**USE Lab Test**

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1.

**lib.use file**

model Library

class Book

attributes

title : String

author : String

no\_copies : Integer

no\_onshelf : Integer

operations

borrow()

end

class Copy

attributes

status : String

operations

borrow( m : Member)

end

class Member

attributes

name : String

student\_id : String

address : String

no\_onloan : Integer

fine : Integer

operations

okToBorrow() : Boolean

borrow(c : Copy)

end

association HasBorrowed between

Member[0..1] role borrower

Copy[\*] role borrowed

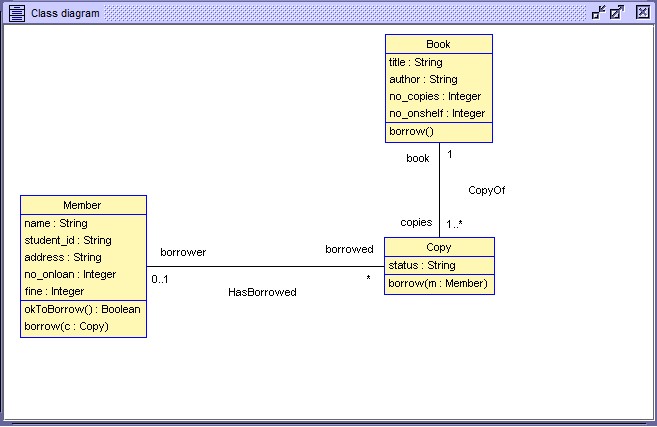
end

association CopyOf between

Copy[1..\*] role copies

Book[1] role book

end



2.

**lib.soil file**

-- Script generated by USE 4.1.1

!new Book('bible')

!bible.title := null

!bible.author := 'The Man Above'

!bible.no\_copies := 2

!bible.no\_onshelf := 2

!new Book('WandP')

!WandP.title := 'War & Peace'

!WandP.author := 'Tolstoy'

!WandP.no\_copies := null

!WandP.no\_onshelf := null

**lib.olt file**

<?xml version="1.0" encoding="UTF-8"?><diagram\_Layout version="13">

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<antialiasing>false</antialiasing>

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<showattributes>true</showattributes>

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</diagramOptions>

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<y>157.8733188503061</y>

</strategy>

<hidden>false</hidden>

</node>

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</strategy>

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</node>

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<name>tom</name>

<strategy type="org.tzi.use.gui.views.diagrams.elements.positioning.StrategyFixed">

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</strategy>

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</node>

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<name>WandP</name>

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<x>58.820248628056675</x>

<y>28.013570947597714</y>

</strategy>

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</node>

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<name>c1</name>

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</strategy>

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</node>

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<name>you</name>

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</node>

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<x>418.2561002302849</x>

<y>182.0793140683425</y>

</strategy>

<hidden>false</hidden>

</node>

<edge type="BinaryEdge">

<source>c2</source>

<target>bible</target>

<name>CopyOf</name>

<properties>

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<name>book</name>

<strategy type="org.tzi.use.gui.views.diagrams.elements.positioning.StrategyRelativeToAttached">

<userOffsetX>0.0</userOffsetX>

<userOffsetY>0.0</userOffsetY>

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<offset\_x>8</offset\_x>

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<placement>TOP</placement>

</strategy>

<hidden>false</hidden>

</edgeproperty>

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<name>1</name>

<strategy type="org.tzi.use.gui.views.diagrams.elements.positioning.StrategyRelativeToAttached">

<userOffsetX>0.0</userOffsetX>

<userOffsetY>0.0</userOffsetY>

<attached>[CopyOf : (book:bible, copies:c2)]::WayPoint::1</attached>

<offset\_x>8</offset\_x>

<offset\_y>8</offset\_y>

<placement>BOTTOM</placement>

</strategy>

<hidden>false</hidden>

</edgeproperty>

<edgeproperty id="[CopyOf : (book:bible, copies:c2)]::source::multiplicity" sizeCalculated="true" type="multiplicity" userDefined="false" visible="true">

<name>1..\*</name>

<strategy type="org.tzi.use.gui.views.diagrams.elements.positioning.StrategyRelativeToAttached">

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<offset\_y>8</offset\_y>

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<name>copies</name>

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<offset\_x>8</offset\_x>

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<placement>TOP</placement>

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<offsetY>-10.0</offsetY>

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<related1>[CopyOf : (book:bible, copies:c2)]::WayPoint::1</related1>

</related>

</strategy>

<hidden>false</hidden>

</edgeproperty>

</properties>

<waypoints>

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<name>0</name>

<strategy type="org.tzi.use.gui.views.diagrams.elements.positioning.StrategyAttachedIntersection">

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</strategy>

<id>0</id>

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<hidden>false</hidden>

</edgeproperty>

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<strategy type="org.tzi.use.gui.views.diagrams.elements.positioning.StrategyAttachedIntersection">

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</strategy>

<id>1</id>

<specialid>2</specialid>

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</edgeproperty>

</waypoints>

<hidden>false</hidden>

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</edge>

<edge type="BinaryEdge">

<source>c1</source>

<target>bible</target>

<name>CopyOf</name>

<properties>

<edgeproperty id="[CopyOf : (book:bible, copies:c1)]::target::multiplicity" sizeCalculated="true" type="multiplicity" userDefined="false" visible="true">

<name>1</name>

<strategy type="org.tzi.use.gui.views.diagrams.elements.positioning.StrategyRelativeToAttached">

<userOffsetX>0.0</userOffsetX>

<userOffsetY>0.0</userOffsetY>

<attached>[CopyOf : (book:bible, copies:c1)]::WayPoint::1</attached>

<offset\_x>8</offset\_x>

<offset\_y>8</offset\_y>

<placement>BOTTOM</placement>

</strategy>

<hidden>false</hidden>

</edgeproperty>

<edgeproperty id="[CopyOf : (book:bible, copies:c1)]::target::rolename" sizeCalculated="true" type="rolename" userDefined="false" visible="true">

<name>book</name>

<strategy type="org.tzi.use.gui.views.diagrams.elements.positioning.StrategyRelativeToAttached">

<userOffsetX>0.0</userOffsetX>

<userOffsetY>0.0</userOffsetY>

<attached>[CopyOf : (book:bible, copies:c1)]::WayPoint::1</attached>

<offset\_x>8</offset\_x>

<offset\_y>8</offset\_y>

<placement>TOP</placement>

</strategy>

<hidden>false</hidden>

</edgeproperty>

<edgeproperty id="[CopyOf : (book:bible, copies:c1)]::source::multiplicity" sizeCalculated="true" type="multiplicity" userDefined="false" visible="true">

<name>1..\*</name>

<strategy type="org.tzi.use.gui.views.diagrams.elements.positioning.StrategyRelativeToAttached">

<userOffsetX>0.0</userOffsetX>

<userOffsetY>0.0</userOffsetY>

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<offset\_x>8</offset\_x>

<offset\_y>8</offset\_y>

<placement>BOTTOM</placement>

</strategy>

<hidden>false</hidden>

</edgeproperty>

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<name>copies</name>

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<userOffsetY>0.0</userOffsetY>

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<offset\_x>8</offset\_x>

<offset\_y>8</offset\_y>

<placement>TOP</placement>

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<offsetX>0.0</offsetX>

<offsetY>-10.0</offsetY>

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<related0>[CopyOf : (book:bible, copies:c1)]::WayPoint::0</related0>

<related1>[CopyOf : (book:bible, copies:c1)]::WayPoint::1</related1>

</related>

</strategy>

<hidden>false</hidden>

</edgeproperty>

</properties>

<waypoints>

<edgeproperty id="[CopyOf : (book:bible, copies:c1)]::WayPoint::0" sizeCalculated="true" type="WayPoint" userDefined="false" visible="true">

<name>0</name>

<strategy type="org.tzi.use.gui.views.diagrams.elements.positioning.StrategyAttachedIntersection">

<userOffsetX>0.0</userOffsetX>

<userOffsetY>0.0</userOffsetY>

</strategy>

<id>0</id>

<specialid>1</specialid>

<hidden>false</hidden>

</edgeproperty>

<edgeproperty id="[CopyOf : (book:bible, copies:c1)]::WayPoint::1" sizeCalculated="true" type="WayPoint" userDefined="false" visible="true">

<name>1</name>

<strategy type="org.tzi.use.gui.views.diagrams.elements.positioning.StrategyAttachedIntersection">

<userOffsetX>0.0</userOffsetX>

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</strategy>

<id>1</id>

<specialid>2</specialid>

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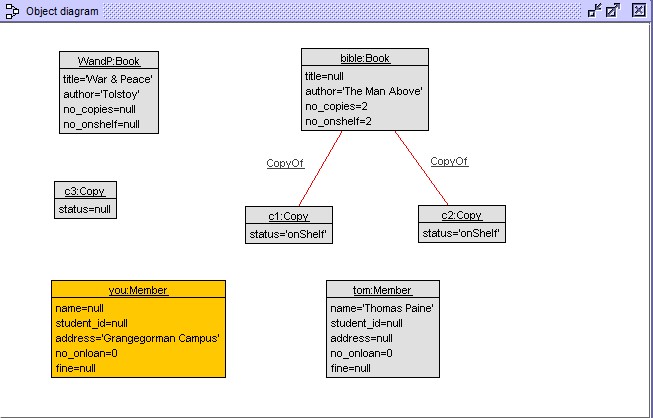
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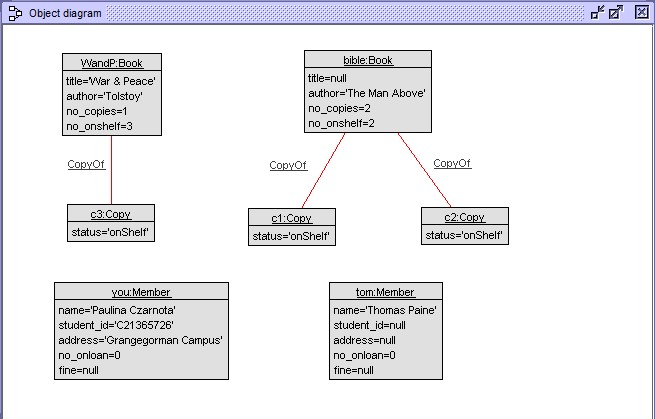
<linkValue>[CopyOf : (book:bible, copies:c1)]</linkValue>

</edge>

</diagram\_Layout>



3.



4.

**lib.use file**

model Library

class Book

attributes

title : String

author : String

no\_copies : Integer

no\_onshelf : Integer

operations

borrow()

end

class Copy

attributes

status : String

operations

borrow( m : Member)

end

class Member

attributes

name : String

student\_id : String

address : String

no\_onloan : Integer

fine : Integer

operations

okToBorrow() : Boolean

begin

if (self.no\_onloan < 2) then

result := true

else

result := false

end

end

borrow(c : Copy)

end

association HasBorrowed between

Member[0..1] role borrower

Copy[\*] role borrowed

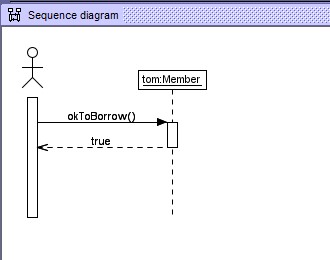
end

association CopyOf between

Copy[1..\*] role copies

Book[1] role book

end



5.

**lib.use file**

model Library

enum BookStatus { available, unavailable, onreserve}

enum CopyStatus { onLoan, onShelf, onreserve }

class Book

attributes

title : String

author : String

no\_copies : Integer

no\_onshelf : Integer

operations

borrow()

begin

self.no\_onshelf := self.no\_onshelf - 1;

end

return()

begin

self.no\_onshelf := self.no\_onshelf + 1;

end

end

class Copy

attributes

status : String

operations

return()

begin

--self.status := #onShelf;

self.book.return()

end

reserve()

borrow( m : Member)

begin

--self.status := #onLoan;

self.book.borrow()

end

end

class Member

attributes

name : String

student\_id : String

address : String

no\_onloan : Integer

fine : Integer

operations

okToBorrow() : Boolean

begin

if (self.no\_onloan < 2) then

result := true

else

result := false

end

end

borrow(c : Copy)

begin

declare ok : Boolean;

ok := self.okToBorrow();

if( ok ) then

insert (self, c) into HasBorrowed;

self.no\_onloan := self.no\_onloan + 1;

c.borrow(self)

end

end

return(c : Copy)

begin

delete (self, c) from HasBorrowed;

self.no\_onloan := self.no\_onloan - 1;

c.return()

end

end

association HasBorrowed between

Member[0..1] role borrower

Copy[\*] role borrowed

end

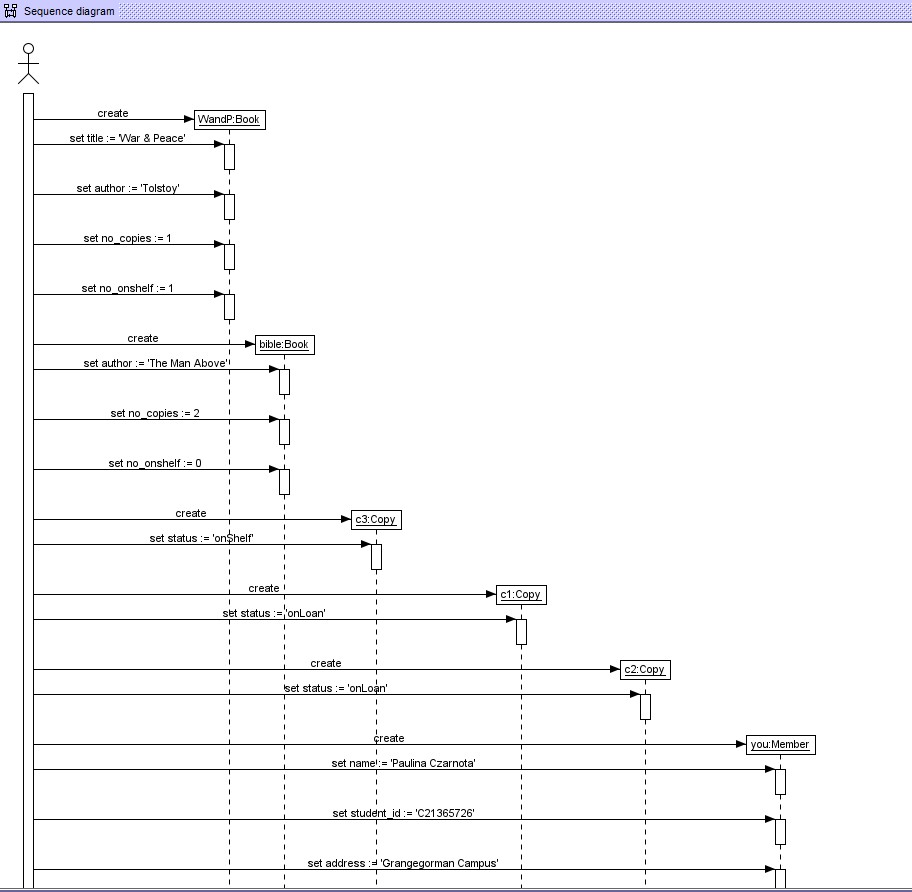
association CopyOf between

Copy[1..\*] role copies

Book[1] role book

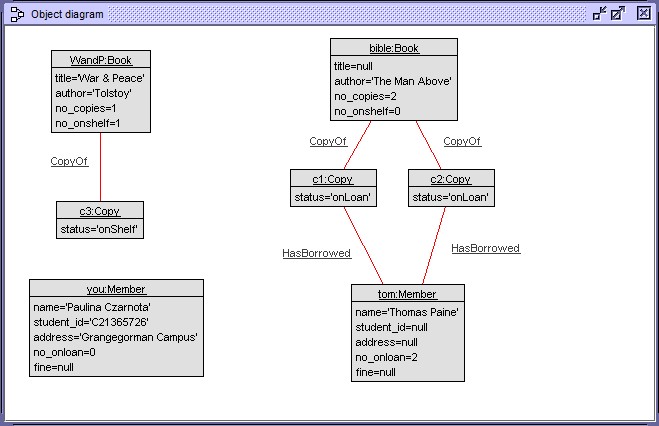
end

6.



Diagram

Description automatically generated



7.

**lib.use file**

model Library

enum CopyStatus { onLoan, onShelf, onreserve }

class Book

attributes

title : String

author : String

no\_copies : Integer

no\_onshelf : Integer

operations

borrow()

end

class Copy

attributes

status : String

operations

borrow(m : Member)

end

class Member

attributes

name : String

student\_id : String

address : String

no\_onloan : Integer

fine : Integer

operations

okToBorrow() : Boolean

begin

if (self.no\_onloan < 2) then

result := true

else

result := false

end

end

borrow(c : Copy)

begin

declare ok : Boolean;

ok := self.okToBorrow();

end

end

association HasBorrowed between

Member[0..1] role borrower

Copy[\*] role borrowed

end

association CopyOf between

Copy[1..\*] role copies

Book[1] role book

end

constraints

context Member::borrow(c:Copy)

pre cond1: self.borrowed->excludes(c)

post cond2: self.borrowed->includes(c)

post cond3: self.no\_onloan < 2