

Software analysis and design

Module 6: Others UML Diagrams

Objectives

- Demonstrate how to read and interpret a:
 - State machine diagram
 - Component diagram
 - Deployment diagram

Where Are We?

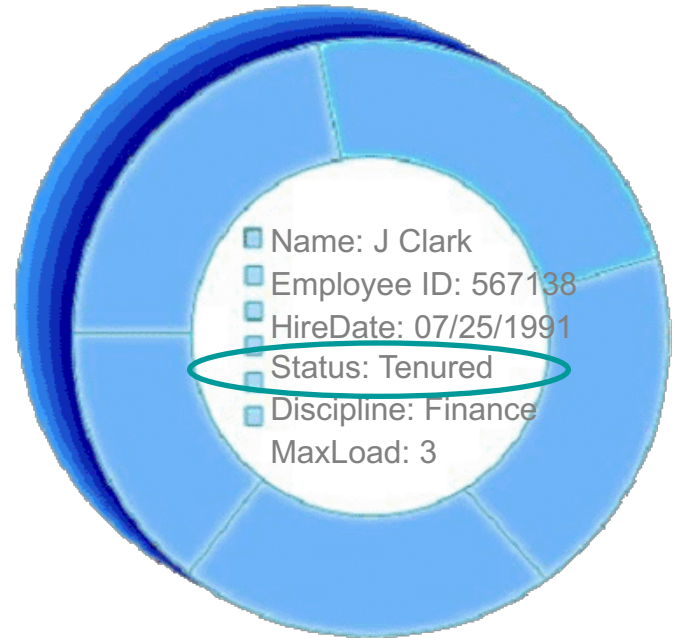
- State machine diagrams
- Component diagrams
- Deployment diagrams

Review: An Object Has State

- State is a condition or situation during the life of an object, which satisfies some condition, performs some activity, or waits for some event.
- The state of an object normally changes over time.



Name: J Clark
Employee ID: 567138
Date Hired: July 25, 1991
Status: Tenured
Discipline: Finance
Maximum Course Load: 3 classes



Professor Clark

Example: Professor

- There are a sequence of events before an instructor becomes a University professor.
 - Assistant professor (achieves tenure by producing a number of quality publications)
 - Tenure/Associate professor
 - Professor (based on seniority)

What Are State Machine Diagrams?

- A state machine diagram models dynamic behavior.
- It specifies the sequence of states in which an object can exist:
 - The events and conditions that cause the object to reach those states
 - The actions that take place when those states are reached



Assistant
Professor

Tenured

Special States

- The initial state is the state entered when an object is created.
 - An initial state is mandatory.
 - Only one initial state is permitted.
 - The initial state is represented as a solid circle.
- A final state indicates the end of life for an object.
 - A final state is optional.
 - A final state is indicated by a bull's eye.
 - More than one final state may exist.



Applied



What Are Events?

- An event is the specification of a significant occurrence that has a location in time and space.
 - An event is an occurrence of a stimulus that can trigger a state transition.
 - Example:
 - Successful publication of numerous papers

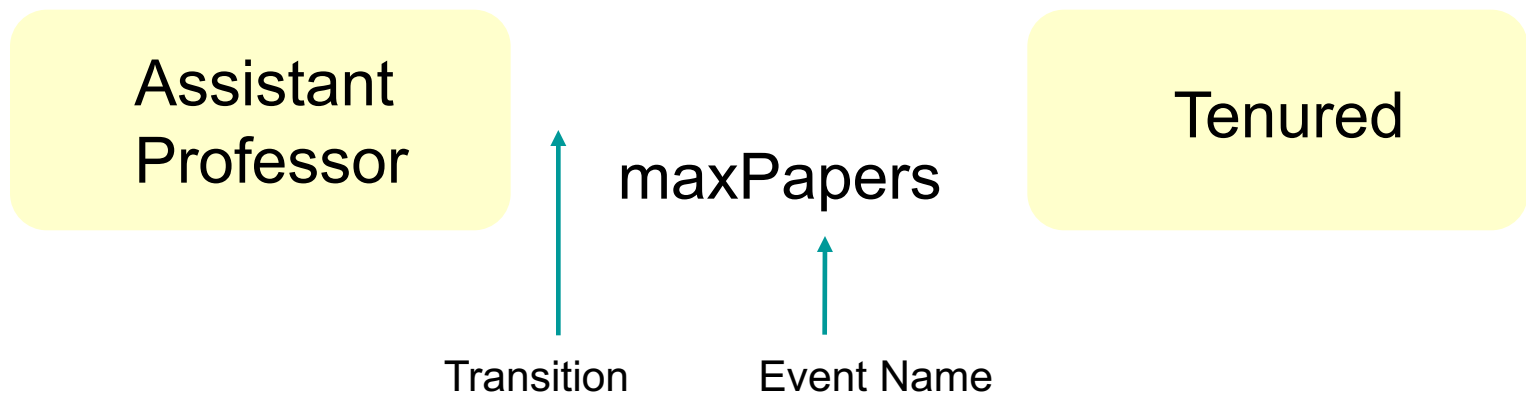
Assistant
Professor

Event

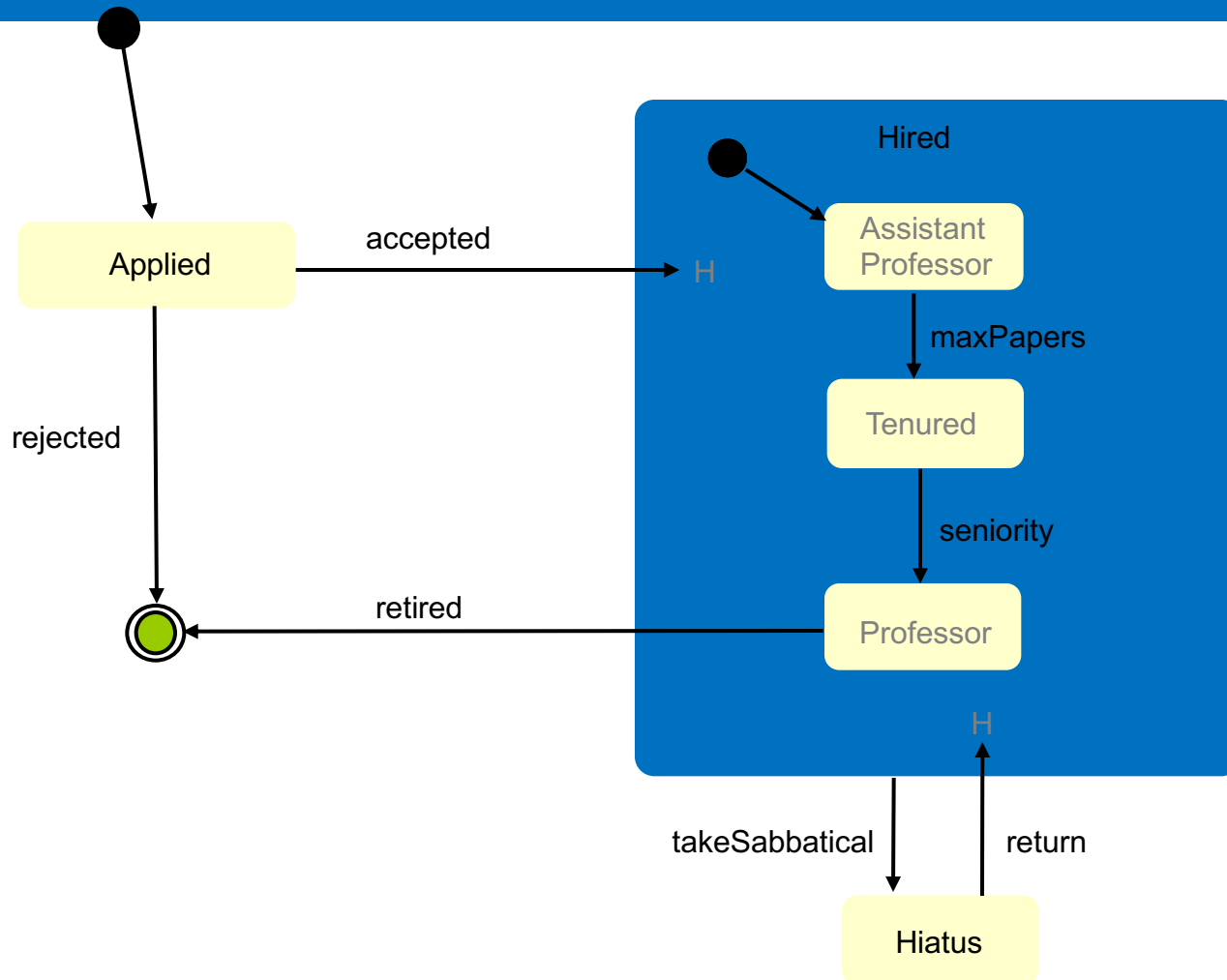
Tenured

What Are Transitions?

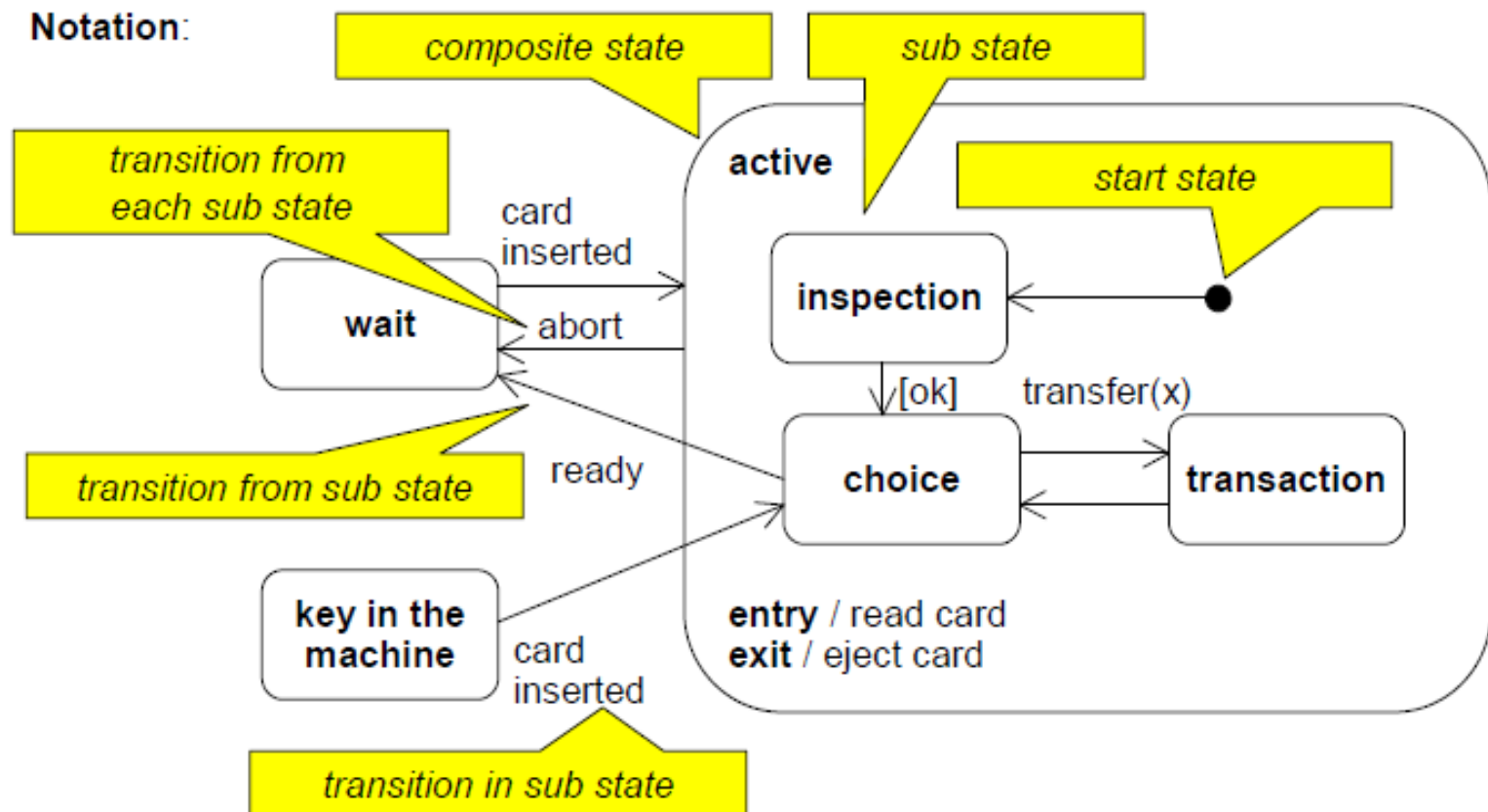
- A transition is a change from an originating state to a successor state as a result of some stimulus.
 - The successor state could possibly be the originating state.
- A transition may take place in response to an event.
- Transitions can be labeled with event names.



Example: State Machine

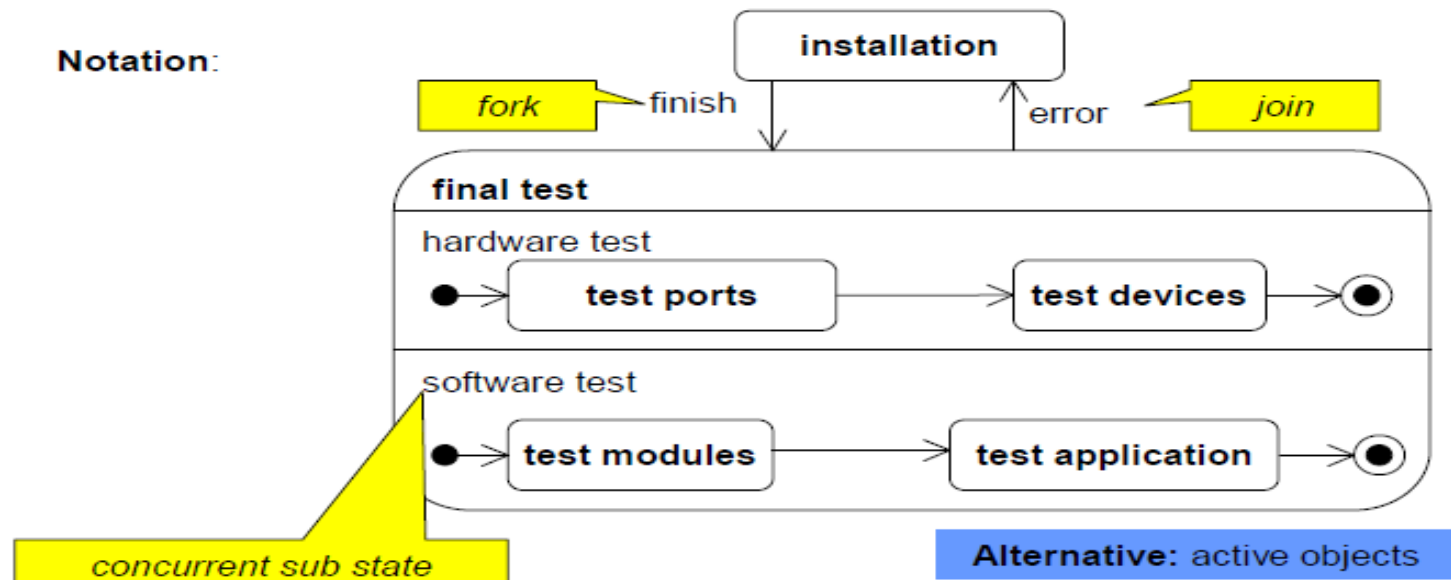


Composite States

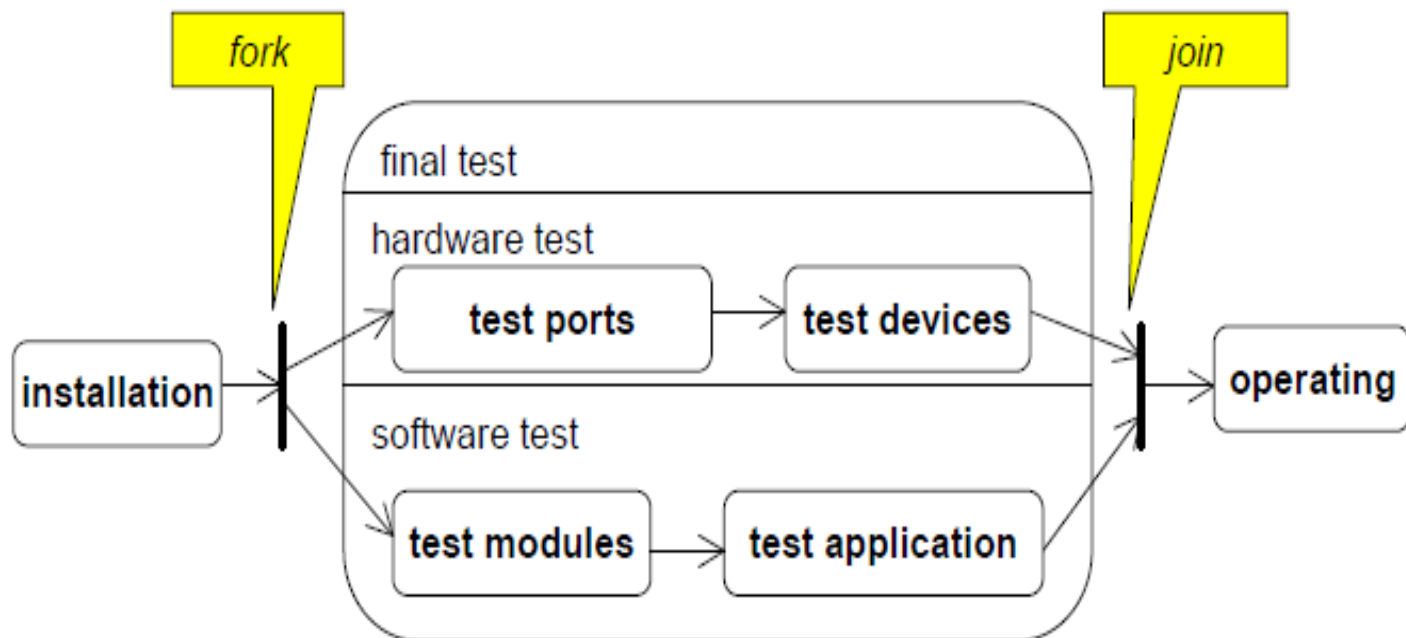


Concurrent Sub States

- In a state several sequences of sub states described by own state machines can be performed concurrently.



Concurrent Sub States: Alternative

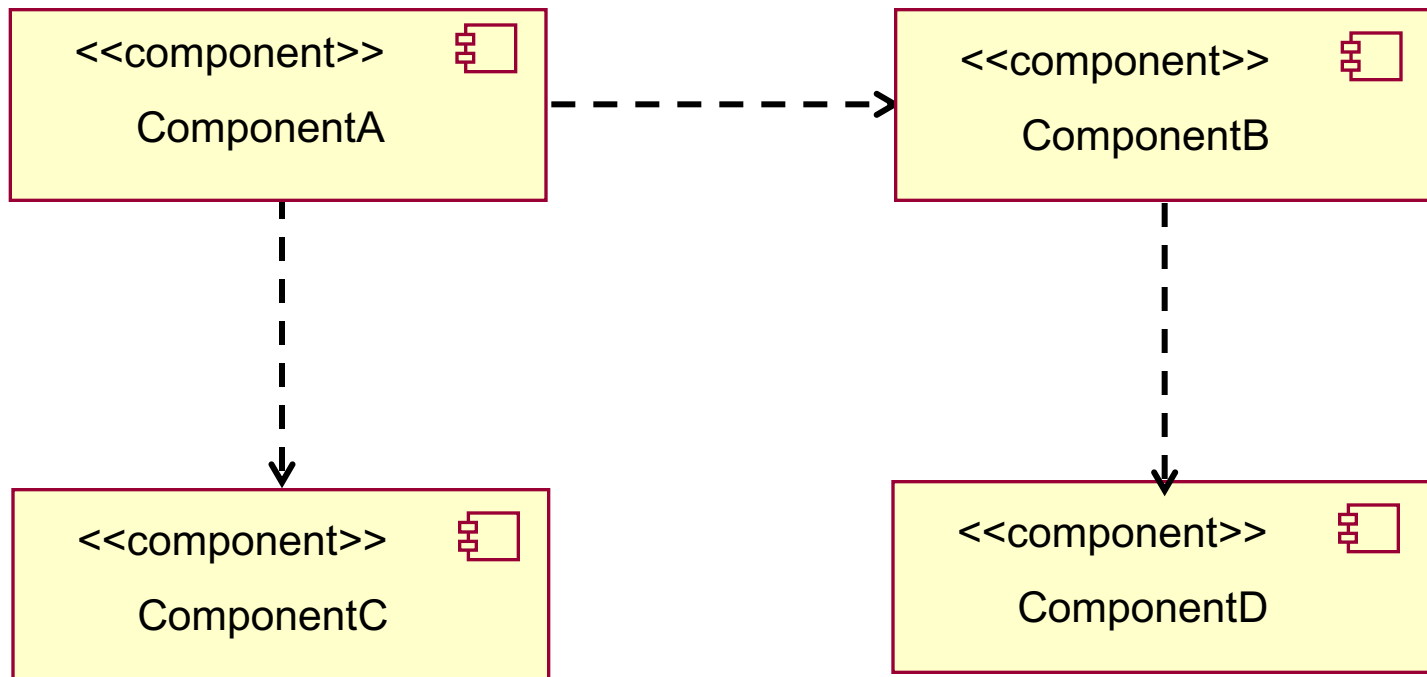


Where Are We?

- State machine diagrams
- **Component diagrams**
- Deployment diagrams

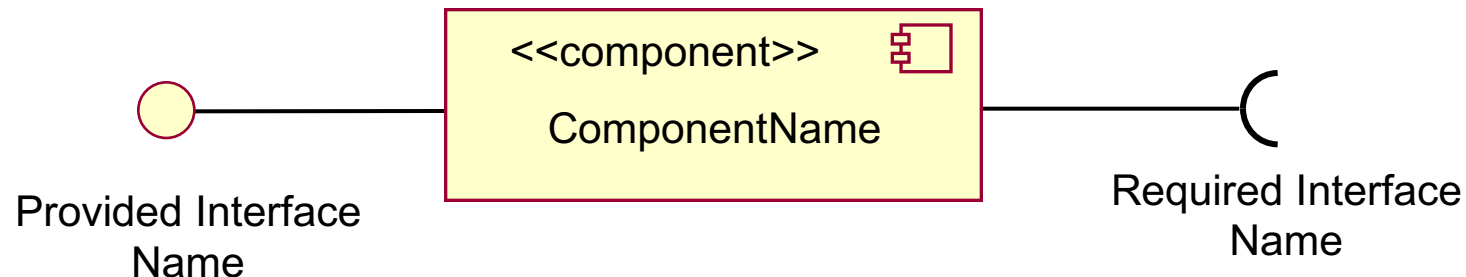
What Is a Component Diagram?

- A diagram that shows the organizations and dependencies among components



What Is a Component?

- A modular part of a system that hides its implementation behind a set of external interfaces.
 - Part of a logical or physical system
- It conforms to and provides the physical realization of a set of interfaces.
- It specifies the physical dependency to interfaces it requires.



Where Are We?

- State machine diagrams
- Component diagrams
- **Deployment diagrams**

What Is a Deployment Diagram?

- The deployment diagram shows:
 - Configuration of processing nodes at run-time
 - Communication links between these nodes
 - Deployed artifacts that reside on them

What Is a Node?

- Represents a run-time computational resource
 - Generally has at least memory and often processing capability.
- Types:
 - Device
 - Physical computational resource with processing capability.
 - May be nested
 - Execution Environment
 - Represent particular execution platforms

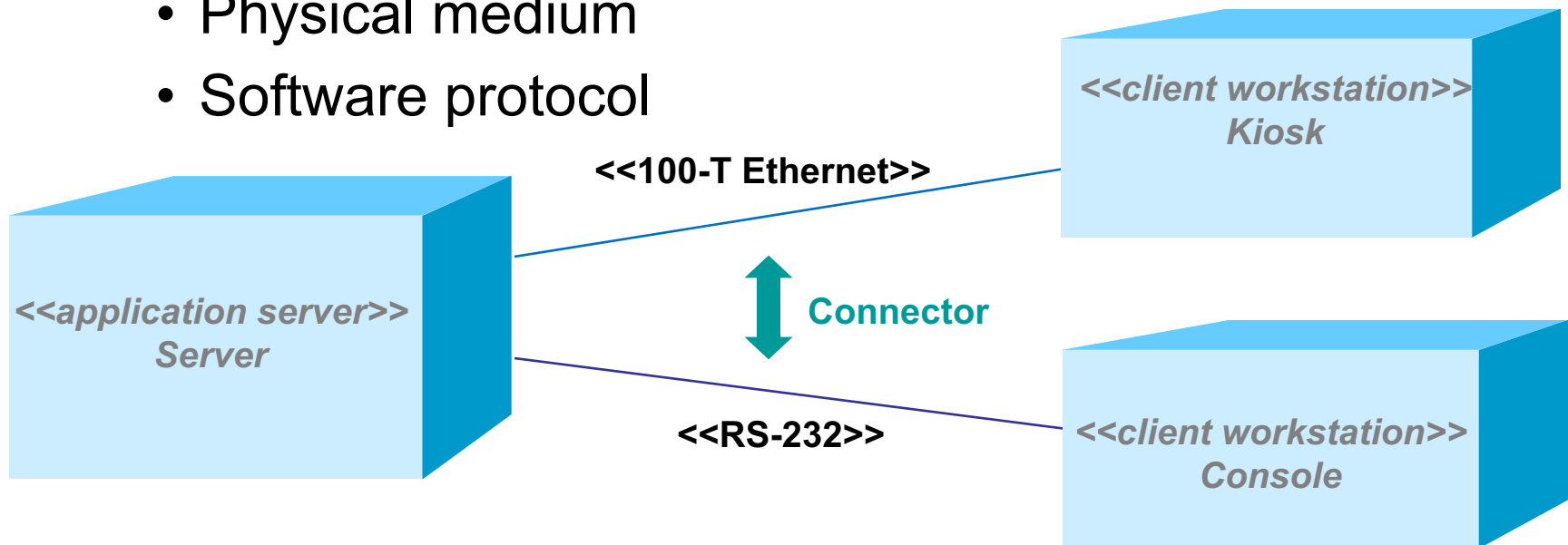
<<device>>
Device Name

<<device>>
***Sub Device
Name***

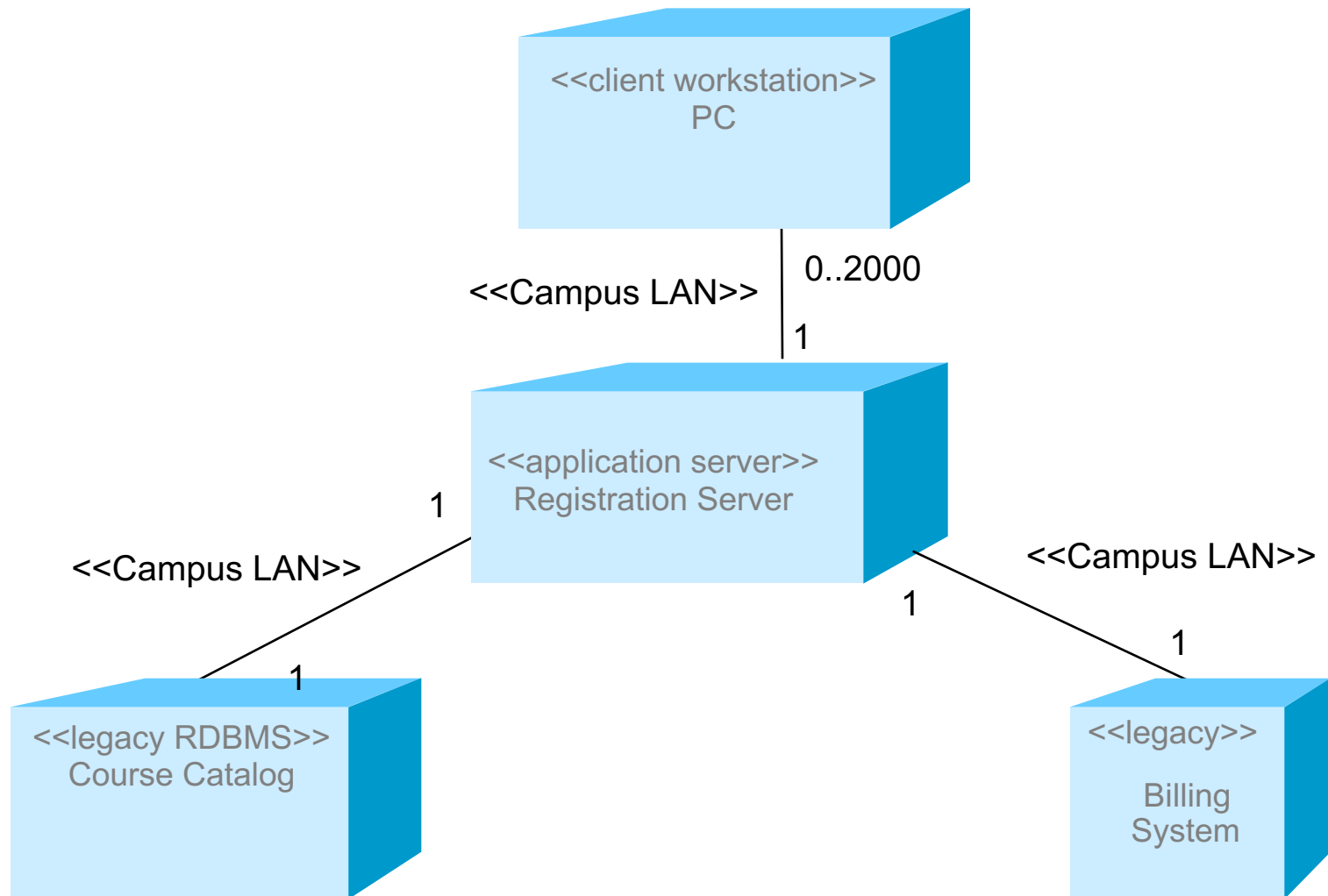
<<exe env>> <i>EE Name</i>

What Is a Connector?

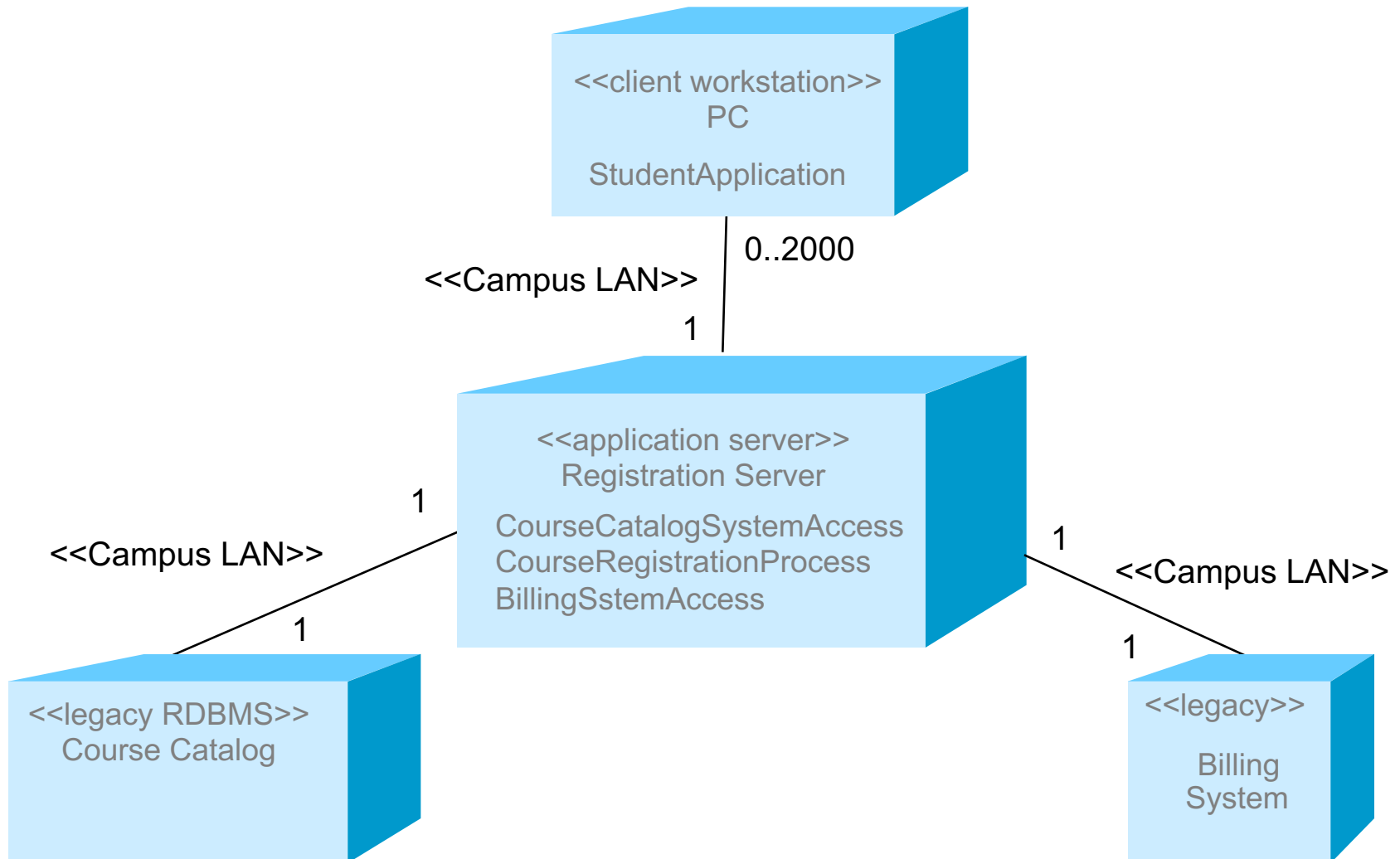
- A connector represents a:
 - Communication mechanism
 - Physical medium
 - Software protocol



Example: Deployment Diagram



Example: Deployment Diagram with Processes



Tools for creating UML diagrams

- Violet (free)
<http://horstmann.com/violet/>
- Rational Rose
<http://www.rational.com/>
- Visual Paradigm UML Suite (trial)
<http://www.visual-paradigm.com/>

Review

- ◆ Define state. How do you determine the classes with significant state?
- ◆ What is a state machine diagram? Describe the different parts of the diagram.
- ◆ What is a component diagram?
- ◆ What is the purpose of a deployment diagram?

