UML for Application Servers

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New Target for Code Generation

- The user of code generation usually must model everything (no runtime services).
- Application servers provide reusable services (don't need to model these every time).
- Examples: transactionality, fault tolerance, concurrency and distribution, and built-in performance optimization.
- Implements the distinction between analysis and design.

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New Issues

- Integrating server functionality transparently to the model and methodology.
- Abstractly specifying some server functionality in the model.
- Specifying the rest of server functionality apart from the model.
- Coding in the model independently of the server.
- Integrating external systems into the model.

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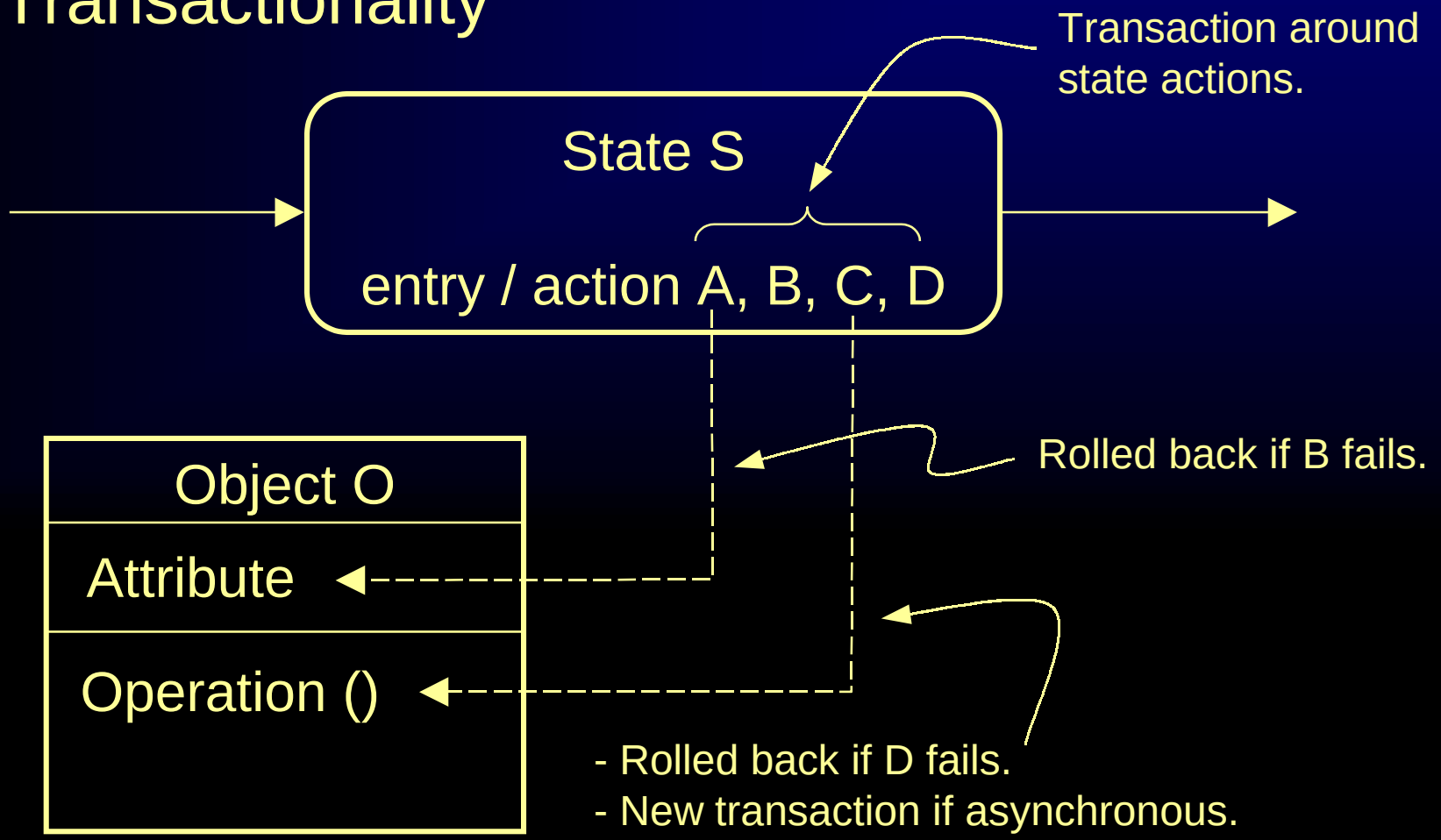
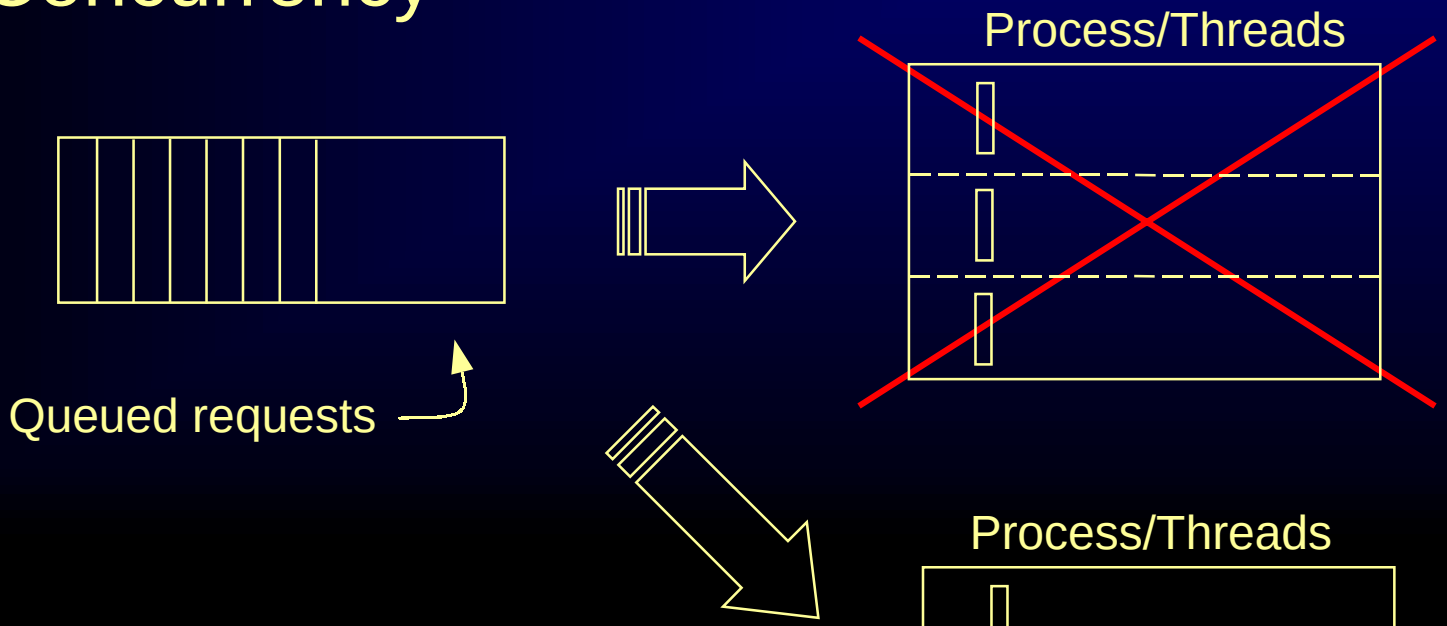
Transparent Server Functionality

- Transactionality



Transparent Server Functionality

- Concurrency



- Fault Tolerance

Abstract Server Functionality

- Modeled as UML tagged values.
- Operations invoked on process state change (initialization, recovery, termination, aborting).
- Non-distributable objects.
- Maintaining a class' extent.
- Operations invoked on association and attribute changes, object creation and deletion, and refresh from external storage.

Server Control Outside of Model

- Choose how objects or attributes are stored, e.g., which are persistently stored.
- Choose how often to refresh an object from external storage to internal cache.
- Compile to a specific target machine.
- Distribute packages of objects to processes and machines.
- Record the above in separate design or deployment models, multiple D&D models per analysis model.

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Model-level Coding

- Server-independent : operate at level of UML models (objects, attributes, states, etc), use on any server.
- Syntax independent : use your favorite coding language.
- Actions are the part of UML for specifying methods, state machine reactions, activity graph steps, collaboration interactions.
- Much more completely specified in the upcoming Action Semantics submission and UML 2.0 OCL submission.

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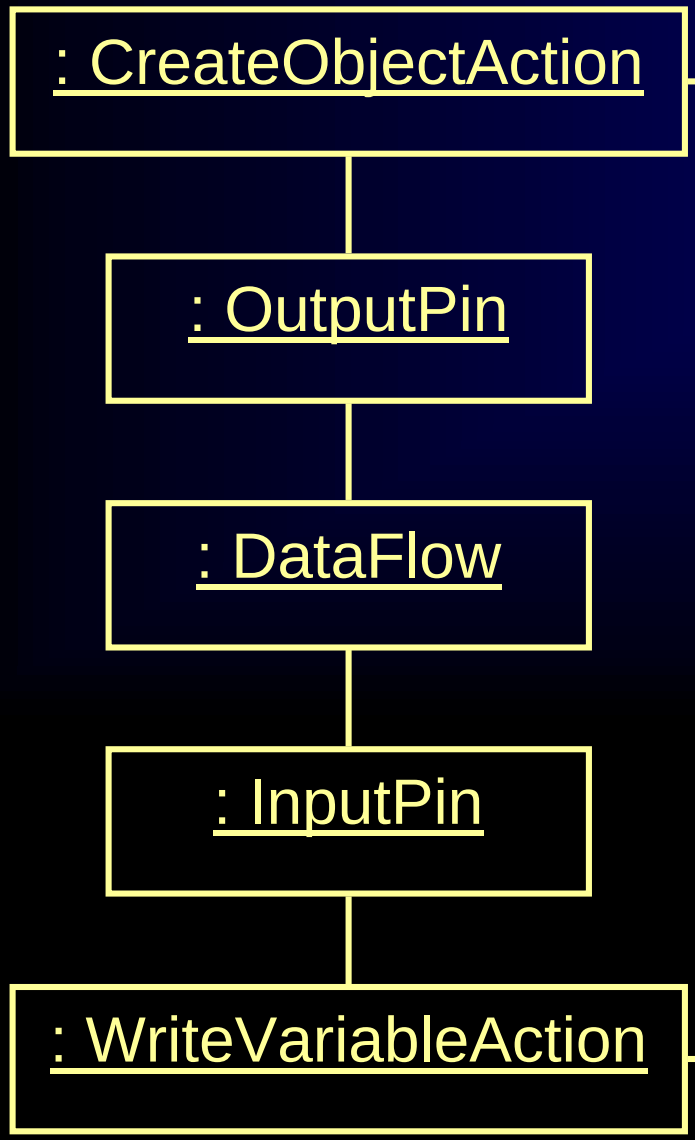
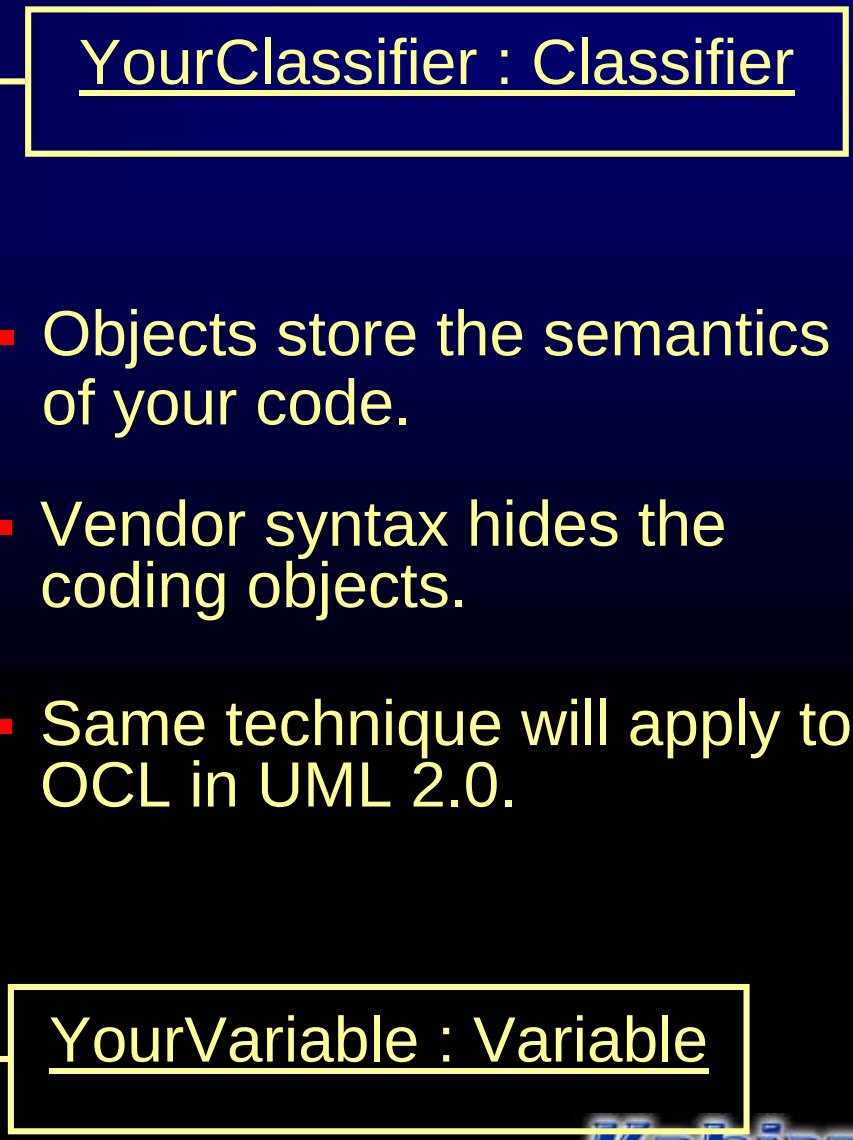
Models of Code





- Objects store the semantics of your code.
- Vendor syntax hides the coding objects.
- Same technique will apply to OCL in UML 2.0.

Model-level Adapters

- External systems appear as objects in the UML model.
- Integrate external systems with model through attributes and relations.
- Surface external behavior through operations and receptions.
- Requires object triggers to map model actions to external system, and access to the model actions from external systems.

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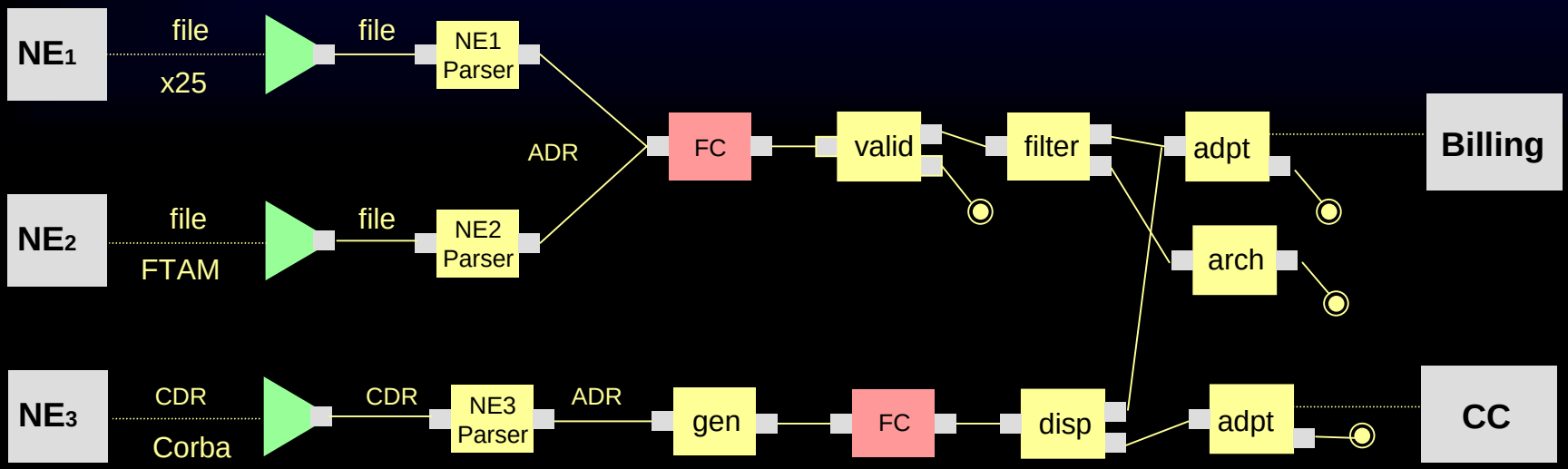
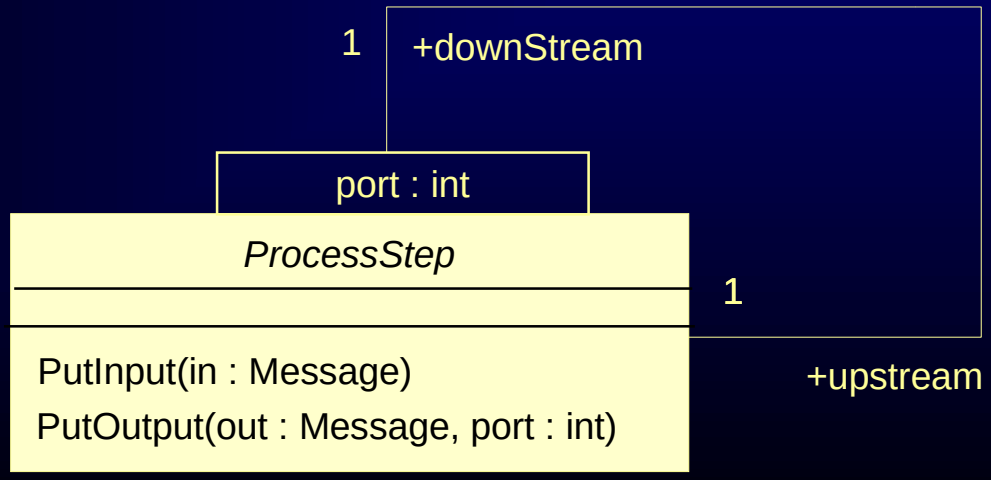
Example

- Mediation between communication networks and business systems.
- Modeled as messages processed step-by-step from one side to the other.



Example

- Steps in flow modeled as abstract classes with virtual operations.



- Application manages flow by passing messages along links between steps.
- Server handles concurrency, distribution, transactionality, fault tolerance, adapters.

For More Information

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