

A Simulation-Based Approach to Software Performance Modeling

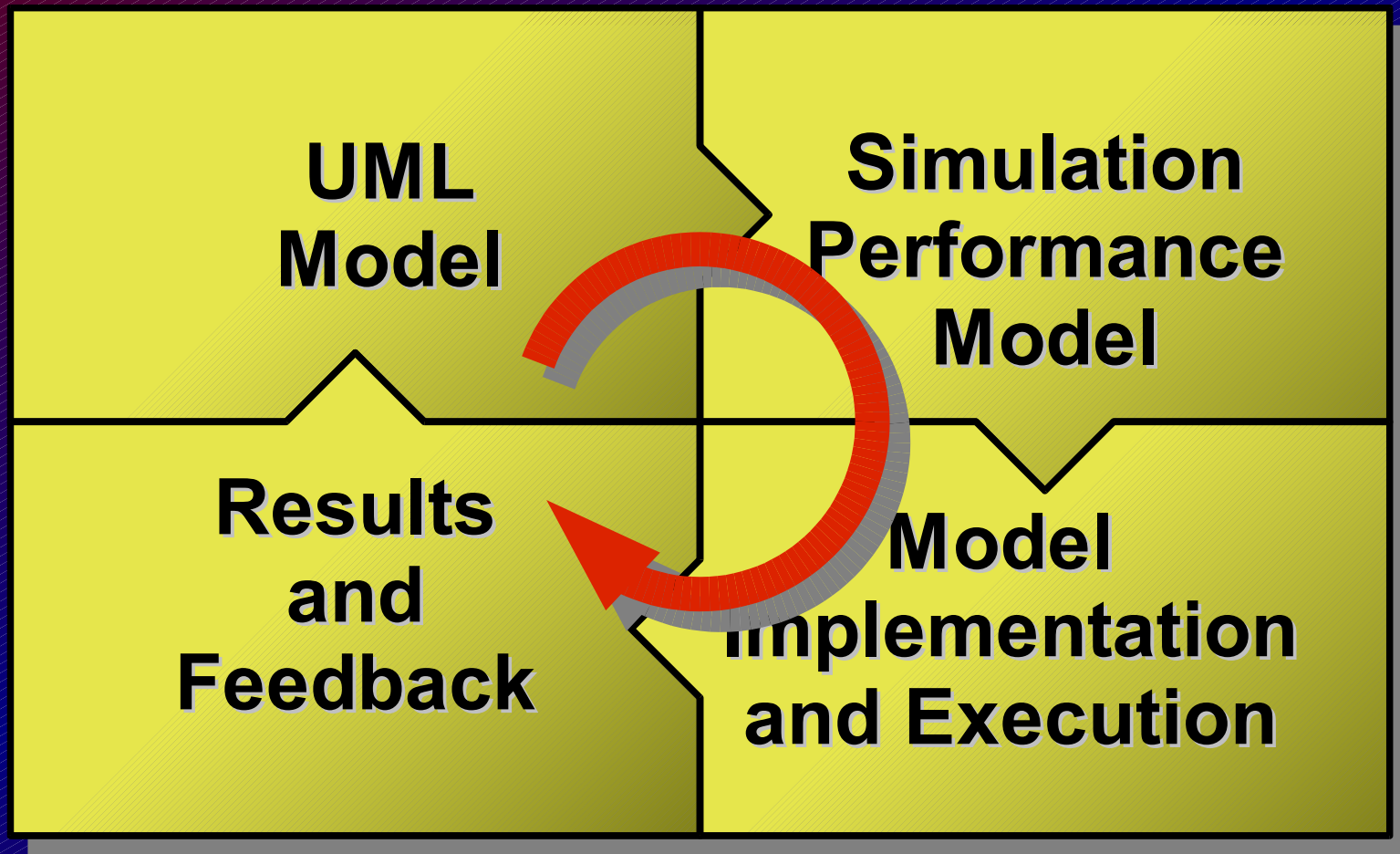
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Performance Evaluation of SA

- Early identification of performance problems in Software Architectures is very useful
 - Costs of changing the design increases as the software development process proceeds
- Performances of SA can be evaluated with
 - Measurement-based approach
(requires a running system)
 - Model-based approach
(can be done at early stages of the software development process)

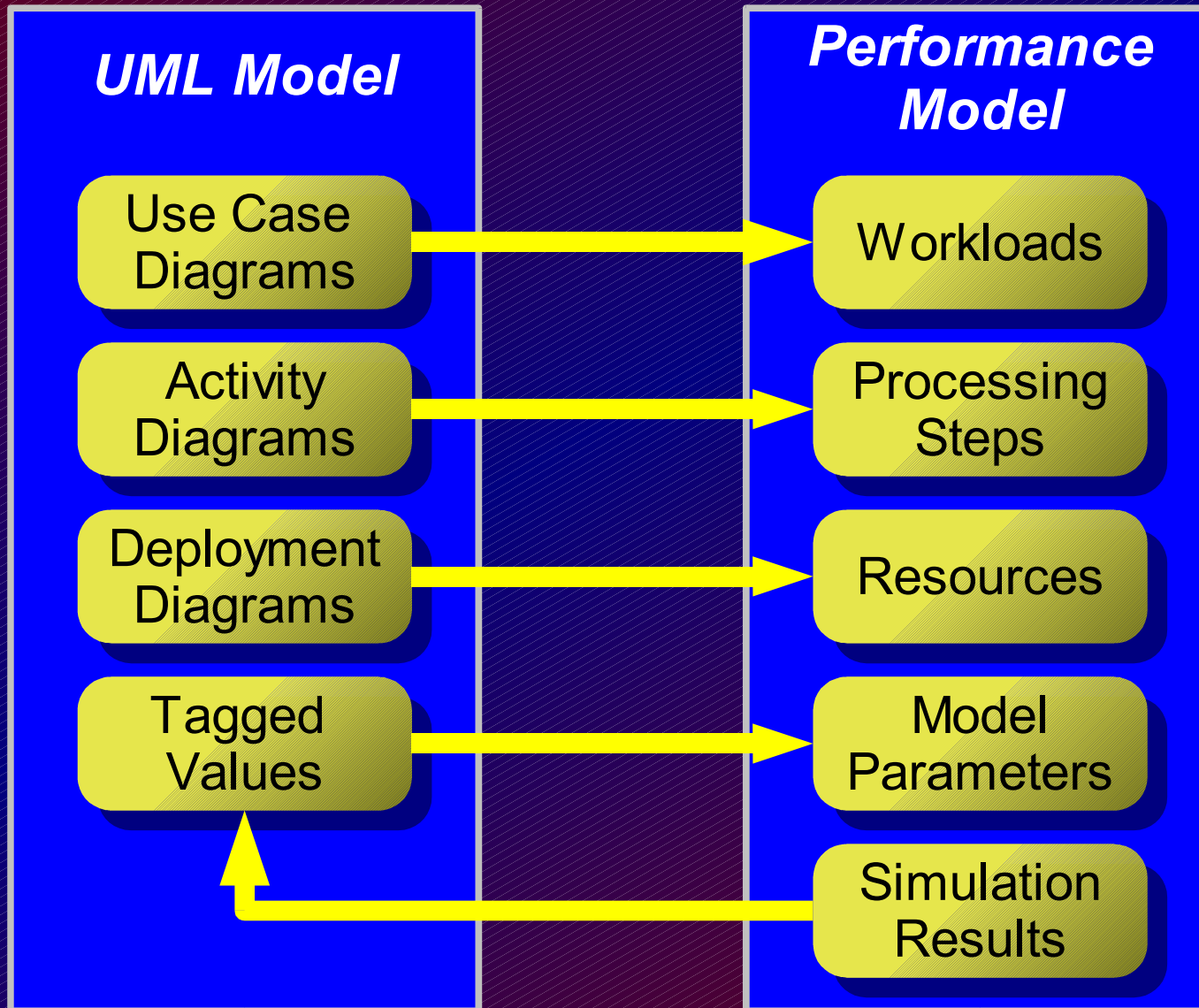
Model-based approach



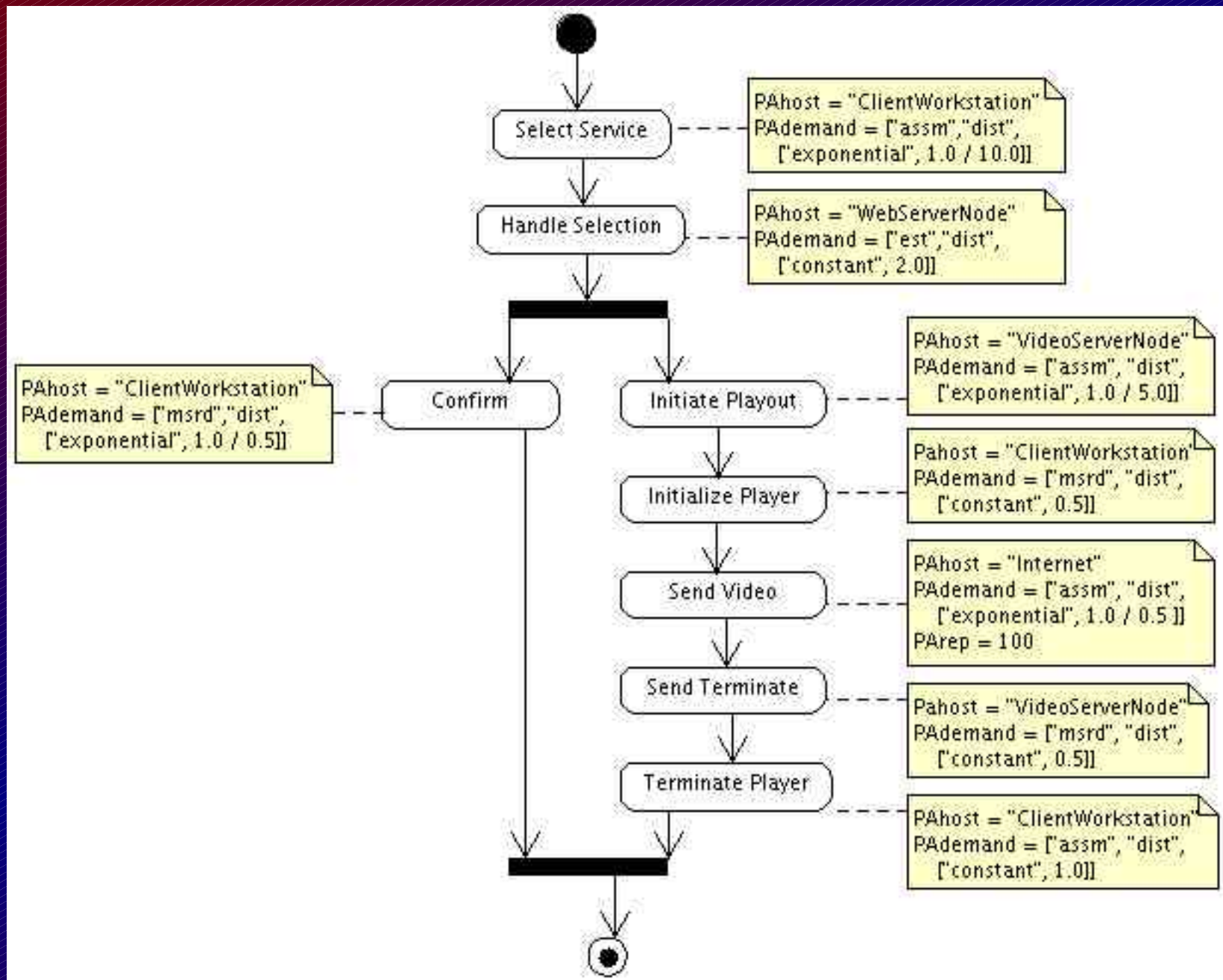
Simulation for Software Performance Evaluation

- Simulation not considered a solution technique for other performance models, but a performance model itself
- Advantages
 - Mapping between Software Model and Performance Model should be immediate
 - No constraints on the Software Model
 - Easy to report feedback into the Software Model

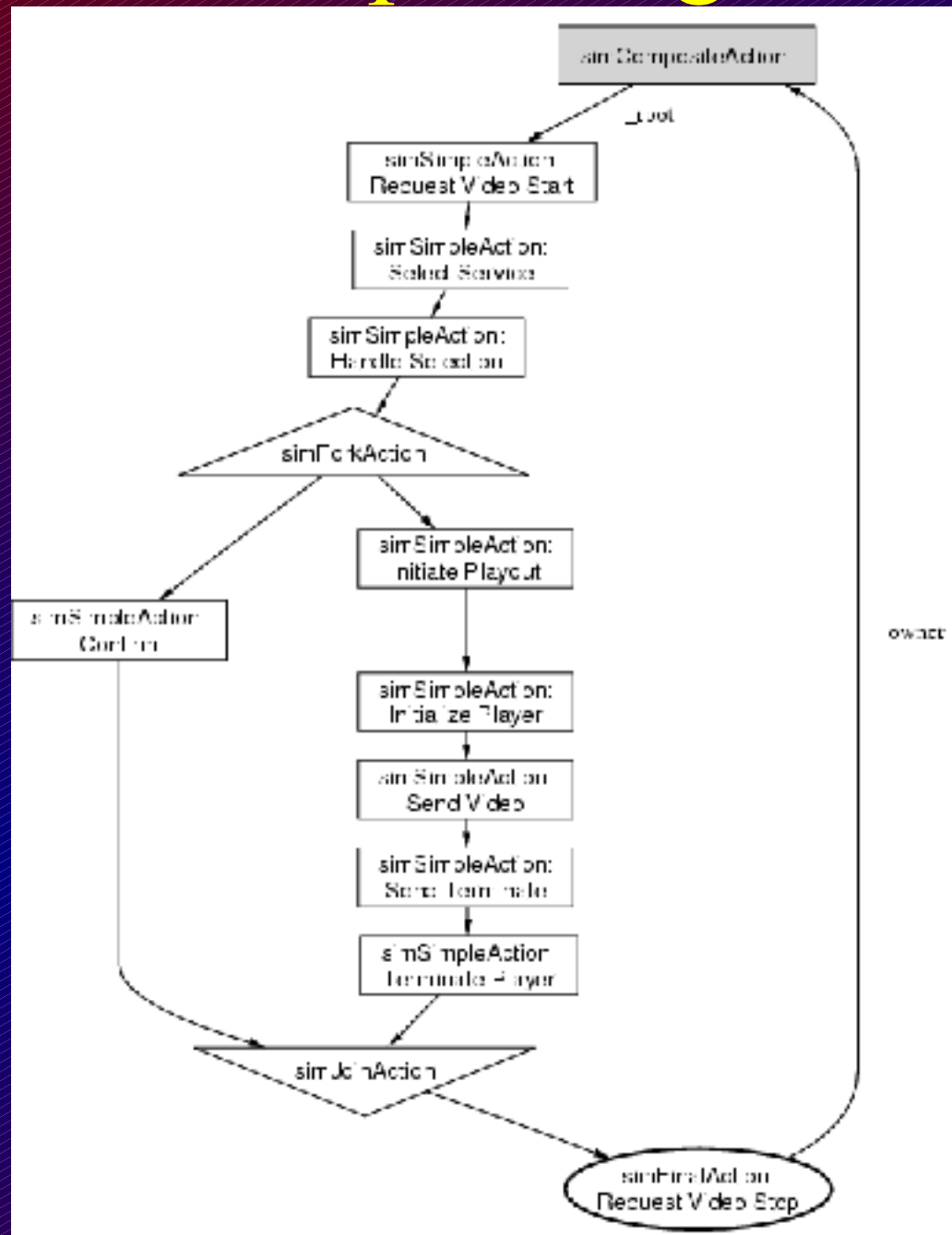
Proposed approach



Sample Annotated Activity Graph...



...And the corresponding simulation model



Additional informations on the poster

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The Challenge

Evaluate the performances of software systems during the early design phase. Feasible without relying the software developer to learn a new specialized notation to do that.

Motivation

Changing the design costs. The cost is higher if the change is done late during the software development cycle. The "fix it later" approach can not be applied here.

Approach

We derive a **Simulation Model** from a UML specification. The UML specification is translated according to (a subset of) the UML Performance Profile. Simulation allows unobstructed representation of general time distributions and arbitrary scheduling policies for jobs in systems.

UML-q (UML Performance Simulator)

UML-q is a tool that takes a UML specification and generates a simulation model. The model is then used to simulate the system and to evaluate its performance. UML-q is implemented in Java and runs on a standard PC. It is available for free download at <http://www.disi.unito.it/~balsamo>.



Sketch of the Modeling Algorithm:

1. Parse the UML specification and generate a simulation model.
2. Translate the UML specification into a simulation model.
3. Simulate the system and evaluate its performance.
4. Generate the simulation results.

1. The user provides a UML specification. UML-q generates a simulation model. The model is then used to simulate the system and to evaluate its performance. UML-q is implemented in Java and runs on a standard PC. It is available for free download at <http://www.disi.unito.it/~balsamo>.



2. The user provides a UML specification. UML-q generates a simulation model. The model is then used to simulate the system and to evaluate its performance. UML-q is implemented in Java and runs on a standard PC. It is available for free download at <http://www.disi.unito.it/~balsamo>.

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A Simple Example



The user provides a UML specification. UML-q generates a simulation model. The model is then used to simulate the system and to evaluate its performance. UML-q is implemented in Java and runs on a standard PC. It is available for free download at <http://www.disi.unito.it/~balsamo>.

