Unit 1.2

Introduction to System

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Unit I : Syllabus

- Introduction:
  - System
  - Models
  - Discrete event simulation and
  - Continuous simulation
- Discrete Event Simulation:
  - Time-Advance Mechanisms
  - Event Modeling of discrete dynamic systems
  - Single-Server Single-Queue Model
  - Event graphics
  - Monte Carlo Simulation

System

is a collection of entities
that act and interact together
toward the accomplishment of
some logical end.

Example:

An automobile Factory

Machines,

Components Parts,

Workers

operate jointly along assembly line.

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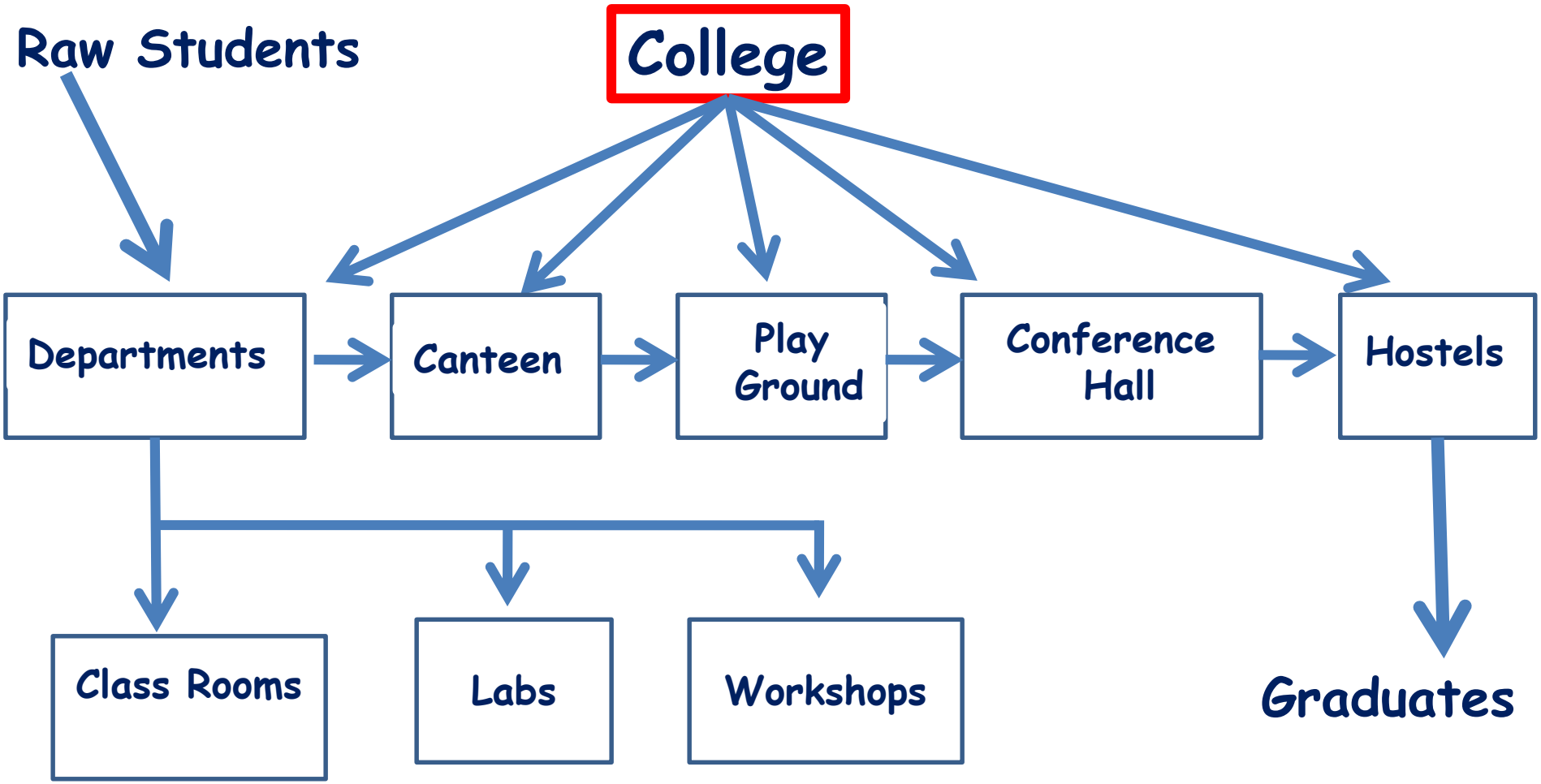
Example : College as a System



College as a System

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Two Types of System Environments

Endogenous

If the system is not affected by the changes occurring within the environment, it is called *endogenous*.

class room in the absence of students, is *endogenous*.

The static model of the aircraft is endogenous.

Exogenous

If the system is affected by changes occurring within the environment, it is called exogenous.

the economic model of a country is affected by the world economic conditions, and is exogenous model.

Bank: Arrival of customers

Aircraft flight is exogenous, as flight profile is effected by the weather conditions

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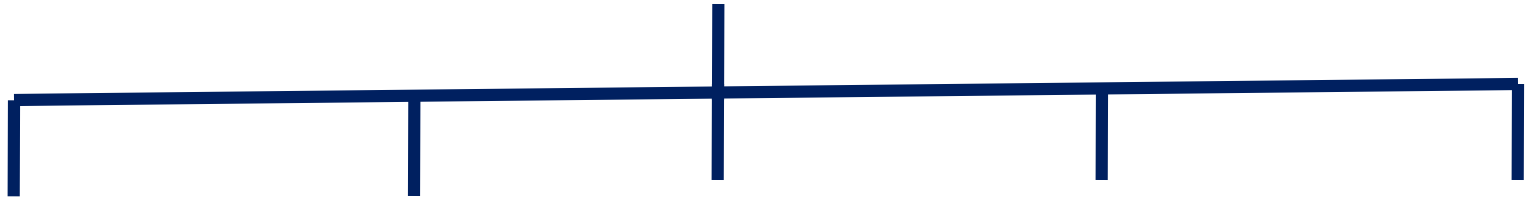
Five Components of a System



Entity

an object of interest in the system.

Attribute

a property of an entity.

Activity

a time period of specified length.

State Variables

the collection of variables necessary to describe the system at any time, relative to the objectives of the study.

Events

an instantaneous occurrence that may change the state of the system.

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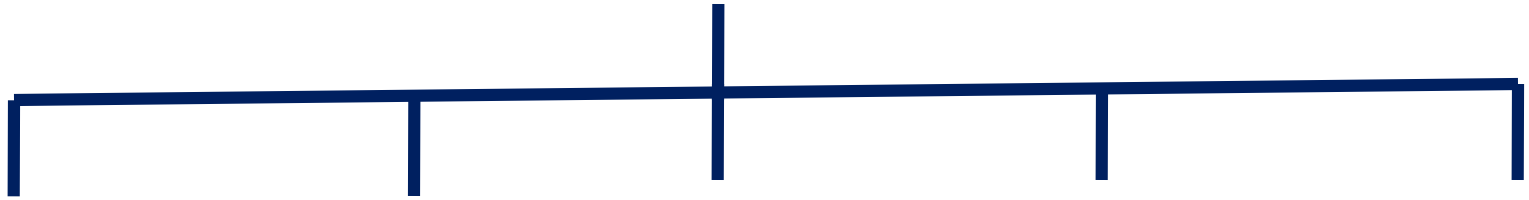
Components of a System: Banking



Entity	Attribute	Activity	State Variables	Events
Employees, Customers	Account Balance	Making Deposits, Withdrawals	No. of Busy Tellers, No. of waiting Customers	Arrival / Departure

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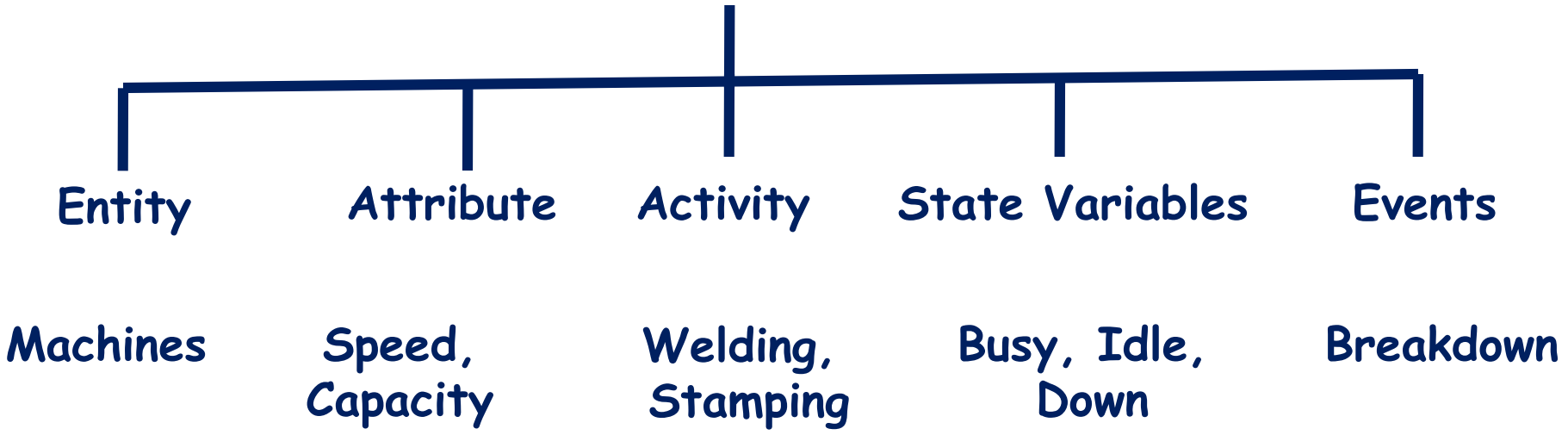
Components of a System : Factory



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Performance Evaluation of a System

Performance Evaluation of a **System** means quantifying the service delivered by the System.

Performance Evaluation of a SYSTEM can be done in two ways

- **Experiment with the Actual System** — Or — **Experiment with a Model of the System**
  - Too costly or disruptive
  - Not appropriate for the design
  - There is always the question of whether it actually reflects the system.
- **Mathematical Model**
  - Make assumptions that take the form of mathematical or logical relationships $d=s \times t$
  - Can be done in two ways:
    - **Analytical Analysis** — If the model is simple enough.e.g., movement of a body calculus, algebra, probability theory
    - Or
    - **Simulation Analysis** — If the model is Highly complex systems, e.g. Weather forecasting

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Performance Evaluation: Performance Metrics

is a measurable quantity

that precisely captures

what we want to measure

(response time, idle time, busy time, throughput, delay, bandwidth etc.)

What does affect the performance?

The performance of a system is dramatically affected by the **Workload:**

The Workload: it characterises

the **quantity** and the **nature** of the system inputs:

In the context of **Web Servers**, system inputs are *http requests* (GET or POST requests).

the **Intensity** of the requests:

How many requests are received by the web server?

High intensities deteriorate the performance.

What does affect the performance?

GET is used to request data from a specified resource.

GET requests is only used to request data (not modify)

GET requests can be cached

GET requests remain in the browser history

GET requests can be bookmarked

GET requests should never be used when dealing with sensitive data

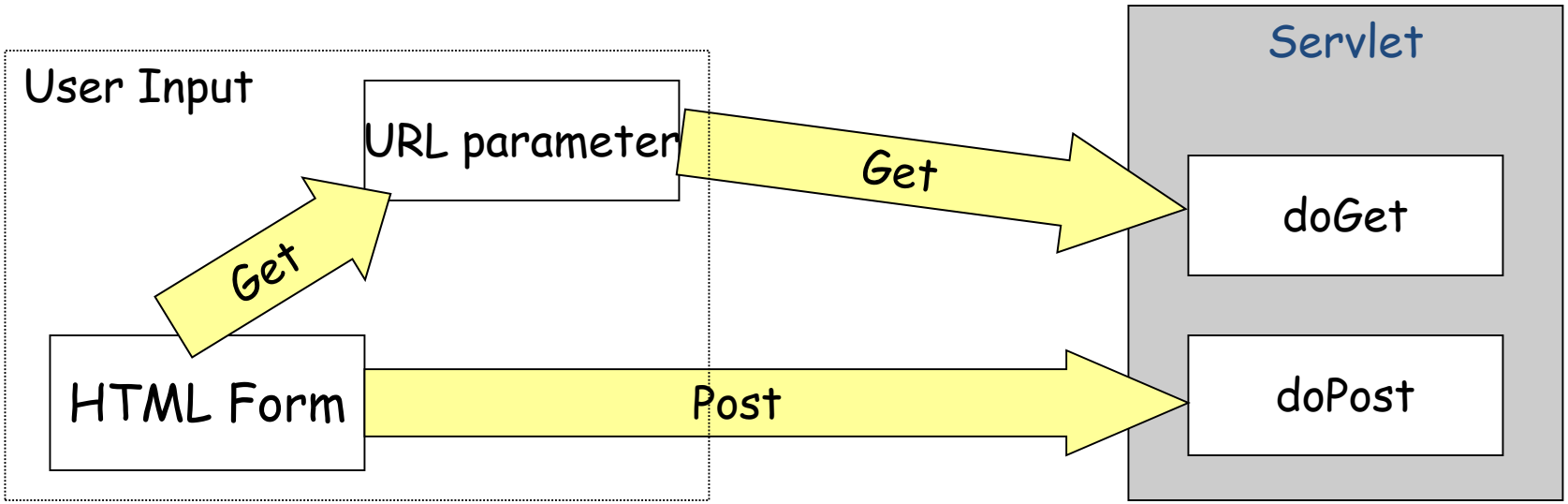
GET requests have length restrictions

What does affect the performance?

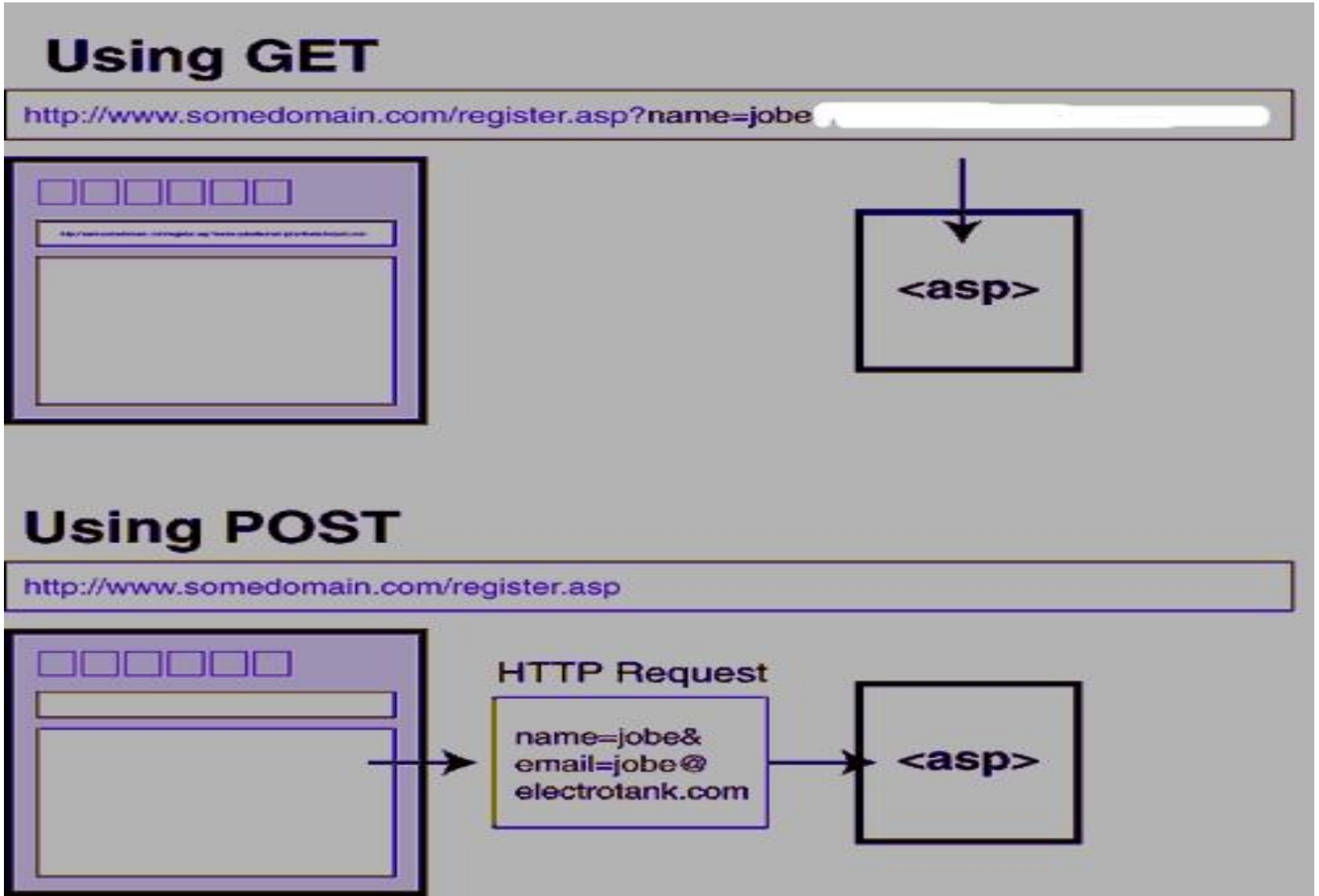
Getting User Data

Get Vs. Post

- Two ways
  - URL parameter (Get)
    - http:// …/somefile?p1=value1&p2=value2
  - HTML Form (Get or Post)



What does affect the performance?



What does affect the performance?

POST is used to send data to a server to create/update a resource.

POST requests are never cached

POST requests do not remain in the browser history

POST requests cannot be bookmarked

POST requests have no restrictions on data length

What does affect the performance?

The Nature of the requests:

The request can be simple GET request or a request that require the access of a remote database.

The performance will be different for different request types.

Benchmarks: used to generate loads that is intended to mimic a typical user behaviour.

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Categories of Systems

Discrete and Continuous Systems

Next PPT

Good Luck!!!