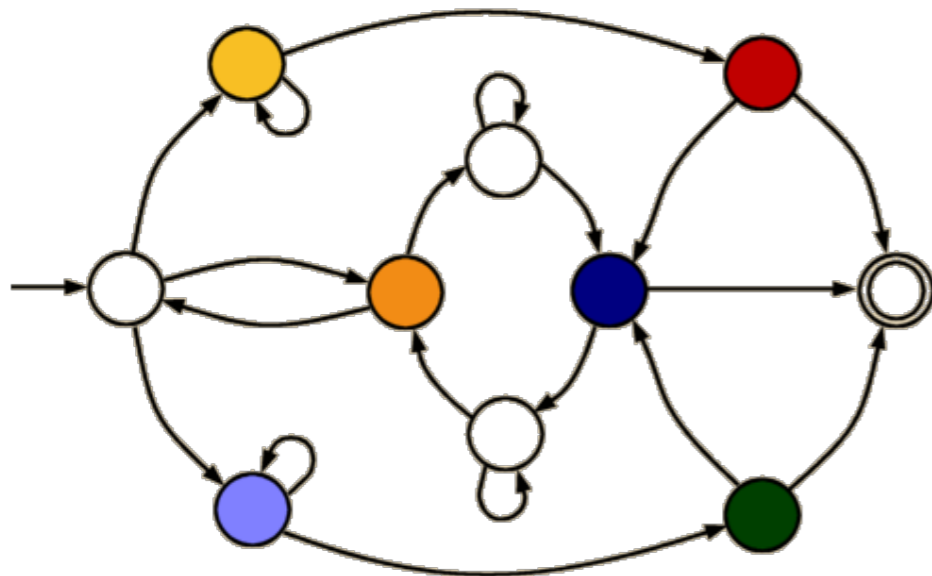


# Discrete Event Systems

## Introduction



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ETH Zürich (D-ITET)

21 September 2023

# Discrete Event Systems

# Discrete Event Systems

**Why** should you care?

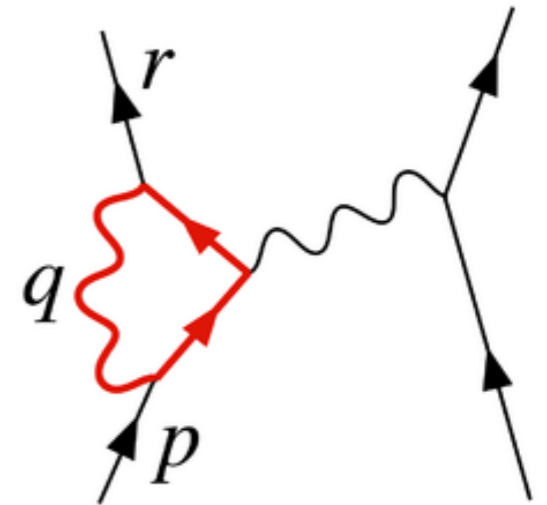
Being based on natural phenomena,  
Science is often explained by continuous variables



Mechanics

$$F = G \frac{m_1 m_2}{r^2}$$

Gravitation



Electrodynamic

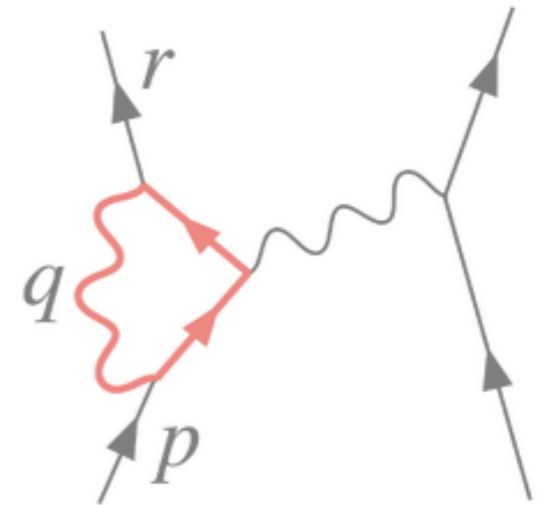
Being based on natural phenomena,  
Science is often explained by continuous variables



Mechanics

$$F = G \frac{m_1 m_2}{r^2}$$

Gravitation



Electrodynamic

**solved by differential equations**

Many complex systems are not continuous...



computer  
systems

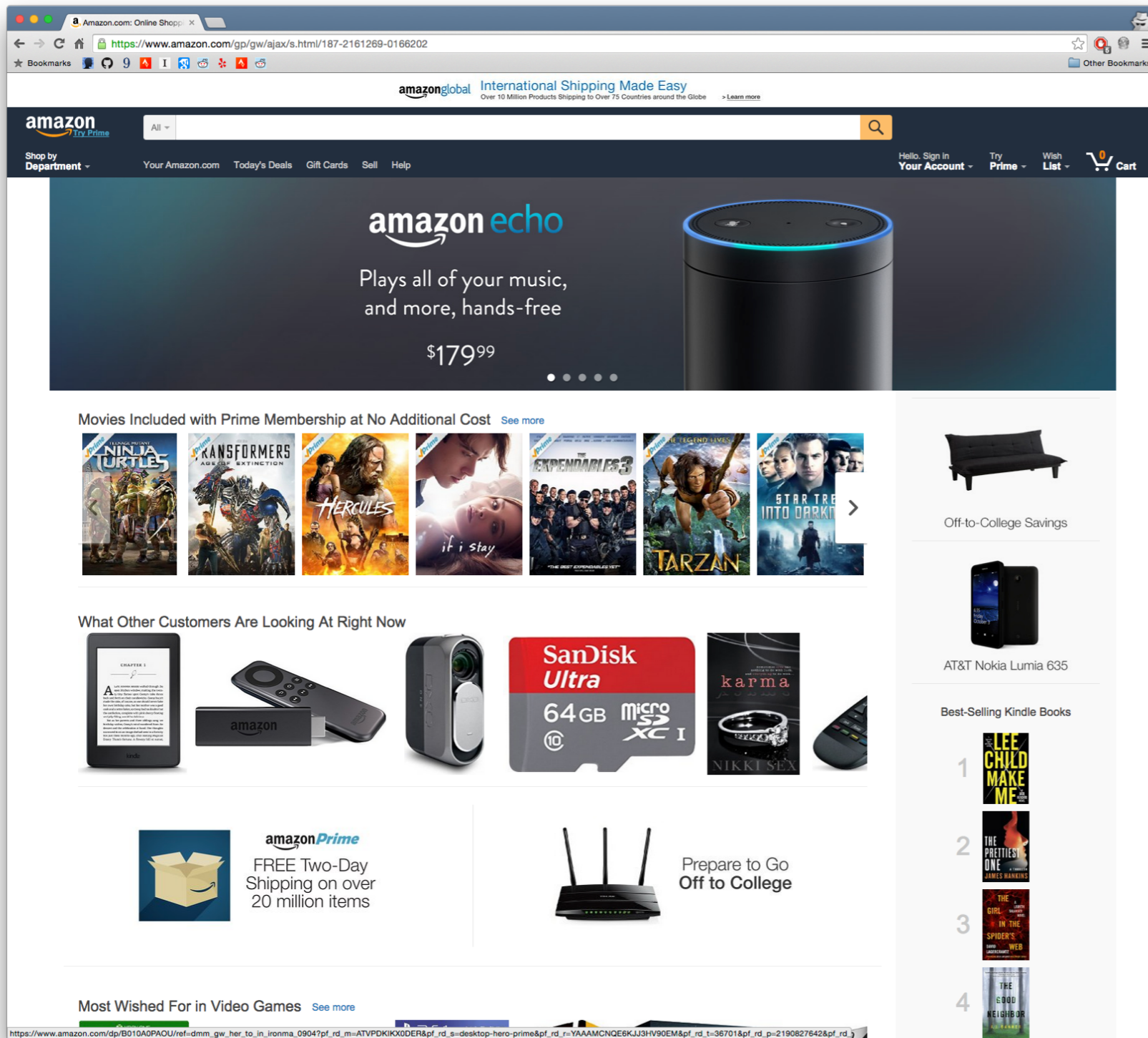
Somewhere inside Google datacenters



transportation systems

NYC subway system





software  
systems

amazon.com home page

Those systems are determined by  
**discrete events**

Customers requests

Telephone calls

Train arrivals

Incoming data

Equipment failures

...

In this course, you'll learn how to

Model

Analyze

Design

Discrete Event Systems

Test

Optimize

some examples

Model

automata & petri nets

Analyze

average-, worst-case viewpoint

Design

out of a specification

Test

proof system properties

Optimize

minimize the system size

# There will be 3 lecturers in the course

Part I



Laurent Vanbever

Automata

Part II



Roger Wattenhofer

Stochastic process

Part III



Lana Josipović

Specification model

Week 1-5



Laurent Vanbever

Automata

Week 6-10



Roger Wattenhofer

Stochastic process

Week 11-14



Lana Josipović

Specification model

# Course organization

Lectures

Thursday 2pm–4pm

@HG D 7.2

Exercices

Thursday 4pm–6pm

@HG D 7.2

Materials

<https://disco.ethz.ch/courses/des/>