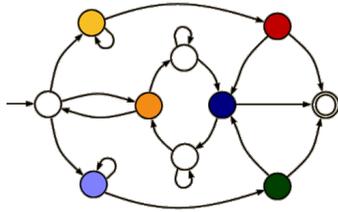


# Discrete Event Systems

## Introduction



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17 September 2020

# Discrete Event Systems

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

## Discrete Event Systems

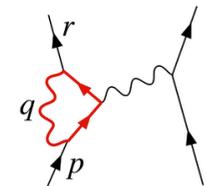
**Why** should you care?



Mechanics

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

Gravitation



Electrodynamic

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

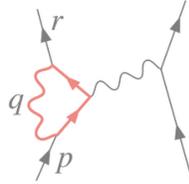
Many complex systems are not continuous...



Mechanics

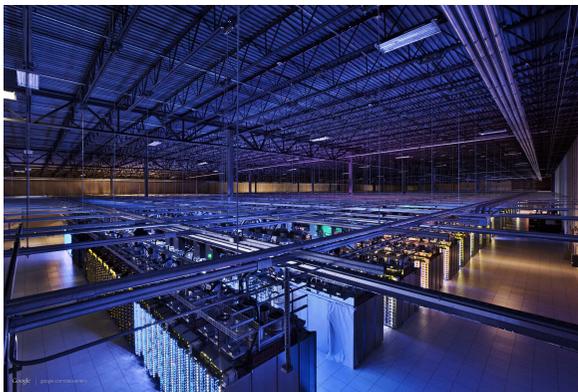
$$F = G \frac{m_1 m_2}{r^2}$$

Gravitation



Electrodynamic

solved by differential equations



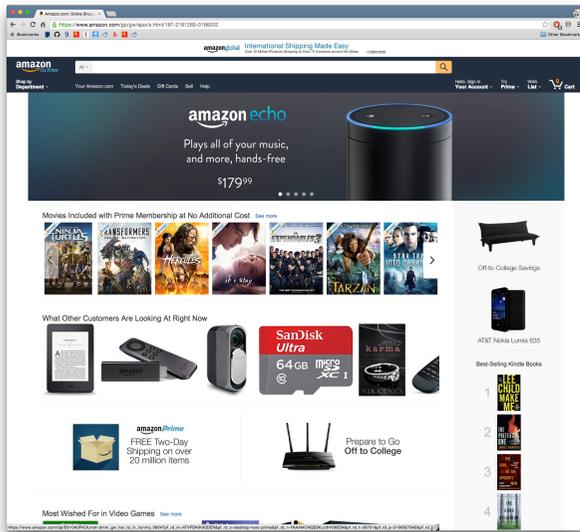
Somewhere inside Google datacenters

computer  
systems



NYC subway system

transportation  
systems



amazon.com home page

software systems

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 professors in the course

Part I



Laurent Vanbever

Automatas

Part II



Roger Wattenhofer

Stochastic process

Part III



Lothar Thiele

Specification model

Week 1-5



Laurent Vanbever

Automatas

Week 6-10



Roger Wattenhofer

Stochastic process

Week 11-13



Lothar Thiele

Specification model

## Course organization

Lectures

Thursday 2pm-4pm

Zoom

Exercices

Thursday 4pm-6pm

Zoom

Materials

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