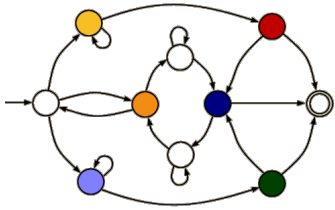


Discrete Event Systems

Introduction



Laurent Vanbever

nsg.ee.ethz.ch

ETH Zürich (D-ITET)

19 September 2019

Discrete Event Systems

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

Discrete Event Systems

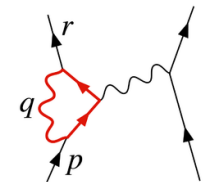
Why should you care?



Mechanics

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

Gravitation



Electrodynamic

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

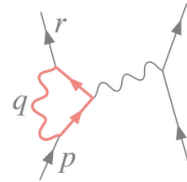
Many complex systems are not continuous...



Mechanics

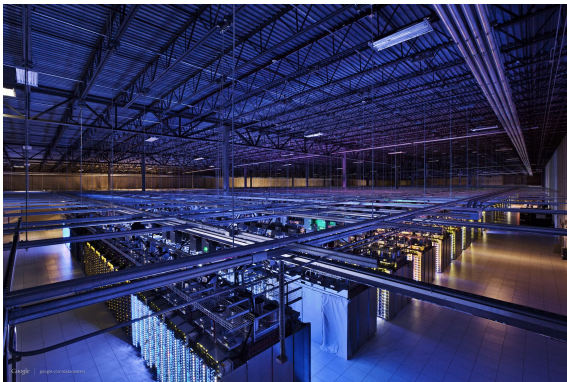
$$F = G \frac{m_1 m_2}{r^2}$$

Gravitation



Electrodynamic

solved by differential equations



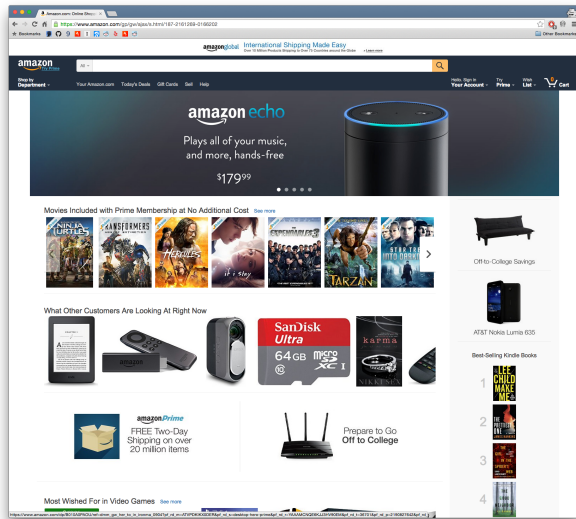
Somewhere inside Google datacenters

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
 - Test
 - Optimize
- Discrete Event Systems

some examples

- Model
 - Analyze
 - Design
 - Test
 - Optimize
- automata & petri nets
 - average-, worst-case viewpoint
 - out of a specification
 - proof system properties
 - 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 1pm-3pm

@ETZ 9

Exercices

Thursday 3pm-5pm

@ETZ 9

Materials

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