Discrete Event Systems

Introduction

Laurent Vanbever
nsg.ee.ethz.ch

ETH Zürich (D-ITET)
23 September 2021
Discrete Event Systems
Discrete Event Systems

Why should you care?
Being based on natural phenomena, Science is often explained by continuous variables.

$F = G \frac{m_1 m_2}{r^2}$
Being based on natural phenomena,
Science is often explained by continuous variables

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

solved by differential equations

Mechanics
Gravitation
Electrodynamic
Many complex systems are not continuous...
Somewhere inside Google datacenters
transportation systems

NYC subway system
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
Design  |  Model  | some examples

Analyze  |  Automata & petri nets  | 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
Romain Jacob
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/](https://disco.ethz.ch/courses/des/) |