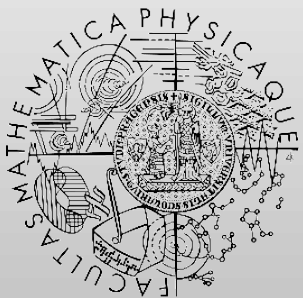


Topics for year projects and bachelor theses

<http://d3s.mff.cuni.cz>



*Department of Distributed
and Reliable Systems*



FACULTY
OF MATHEMATICS
AND PHYSICS
Charles University

Tomas Bures

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Where do you know us from / Where do you know us from



Pavel Ježek

Computer principles, C# language and .NET platform,
Advanced Programming for .NET,



Petr Hnětynka

Java, Python



Jan Kofroň

Models and verification of system behaviour,
Application development for mobile devices



Pavel Parizek

Software Development Tools, Program Analysis and Code Verification,
Formal Software Engineering Fundamentals



Tomáš Petříček

Design of programming languages



Jan Vitek

Where do you know us from / Where do you know us from



Petr Tůma

Operating Systems, Middleware,
Software Performance Evaluation



Vojtěch Horký

Operating Systems, Introduction to
Linux



Lubomir Bulej

Computer architecture, Recommended programming practices,
Software Performance Measurement



Tomas Bures

Python, Concepts of modern programming languages,
Embedded and Real-Time Systems, Software Engineering for Reliable Systems,
Model Driven Development



Martin Kruliš

Programming in a parallel environment,
Computer systems

The context of our themes: Smart systems



What topics you can do with us

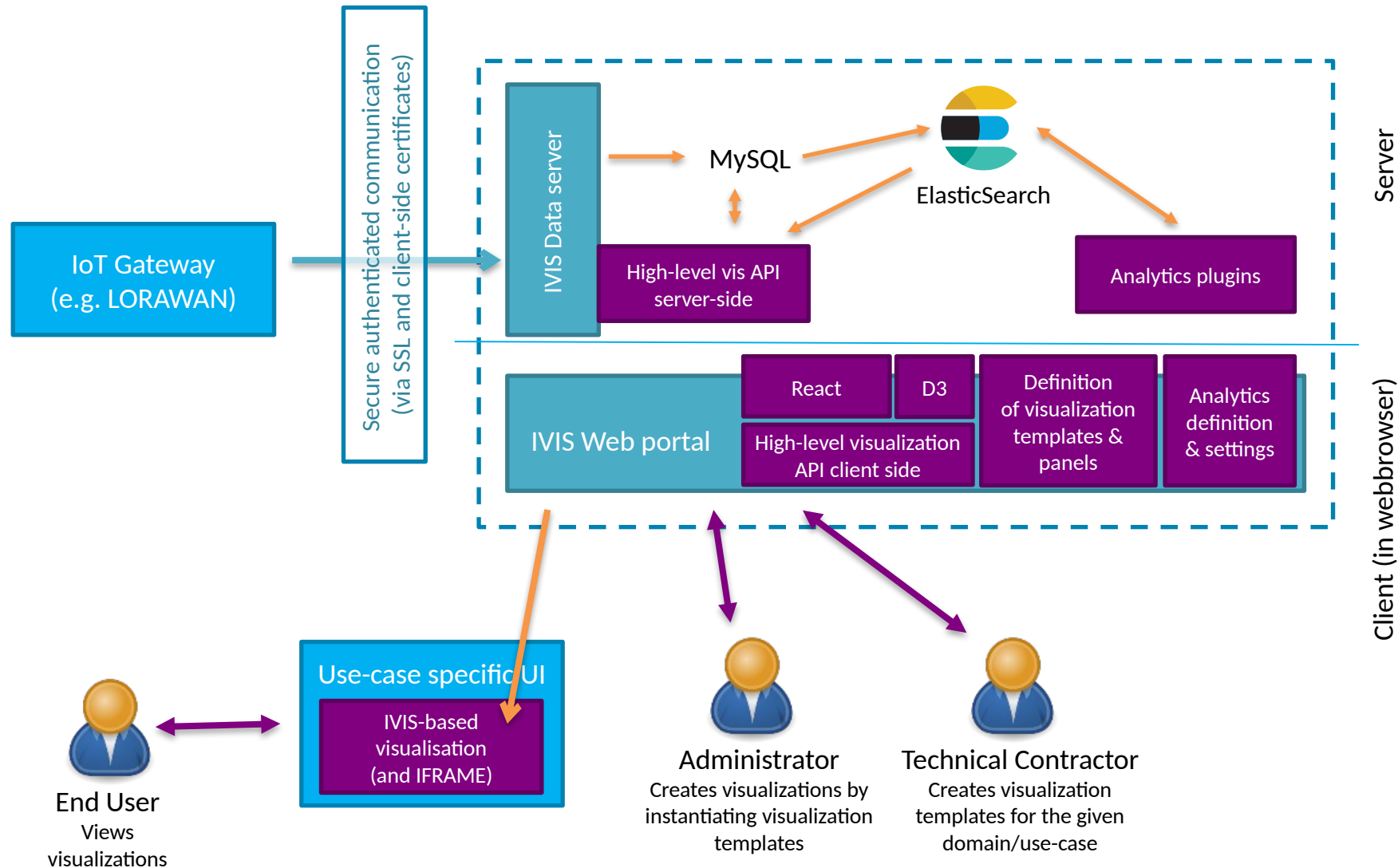
Things related to:

- smart/adaptive systems and machine learning
- virtualization, cloud, edge-cloud systems
- parallel systems and performance computing (not only on GPU)
- containers - Docker, Kubernetes
- Internet of Things (IoT), embedded systems with a small overlap into robotics
- analysis and processing of IoT data
- web technologies
- software performance measurement and evaluation
- distributed systems, middleware, operating systems
- software verification and testing
- technologies around Python, Java, Scala, C#, .NET, JavaScript, TypeScript ...

Applied research projects

- Current projects
 - **ExtremeXP**: EXPerimentation driven and user eXperience oriented analytics for eXtremely Precise outcomes and decisions
 - Modeling and implementation of machine-learning workflows and data visualization in the cloud
 - **SA4CPS**: Secure situational awareness for critical cyber-physical systems
 - Modelling smart systems
 - Modelling and detection of "situations"
 - Integration of AI/ML methods
 - **OP JAK Georizika**: Modelling, forecasting and projection of atmospheric and climatic hazards their impacts
 - Efficient implementation and parallelization of these models (e.g. on GPUs)
 - **GraalVM** (cooperation with Oracle)
 - Benchmarking and analysis of performance changes in compiler and VM (Java)

IVIS Framework - IoT data visualization and analysis



IVIS Dashboard x IVIS Dashboard x

Not secure | https://localhost:8443/settings/templates/1/develop

IVIS Aenean sit Settings Account

Toggle sidebar Home / Settings / Templates / Template "Curabitur porttitor" / Code

Workspaces

Templates

Signals

Signal Groups

Users

Namespaces

Edit Template Code Code Output Settings Share

JSX SCSS Files Parameters Saved

```

1 'use strict';
2
3 import React, {Component} from "react";
4 import styles from './styles.scss';
5 import {TimeContext, TimeRangeSelector, LineChart} from
6
7 export default class Test extends Component {
8   constructor(props) {
9     super(props);
10
11   this.config = {
12     yScale: {
13       includedMin: 0,
14       includedMax: 100
15     },
16     signals: props.params.sensors
17   };
18 }
19
20 render() {
21   return (
22     <TimeContext>
23     <div className="row">
24       <div className="col-xs-12">
25         <TimeRangeSelector/>
26       </div>
27       <div className="col-xs-12">
28         <div>
29           <LineChart
30             config={this.config}
31             height={500}
32             margin={{ left: 40, right: 5, top: 5,
33             withTooltip
34           />
35         </div>
36       </div>
37     </div>
38   </TimeContext>
39 );
40 }
41 }
42

```

Panel for Preview

Duis eget Select

Previous year

2016 February March April May June July August September October November December

Examples of topics for RP and B.Sc. theses

- IoT applications (combining embedded devices and cloud-based management, potentially using a web interface)
 - Management and remote configuration of ESP32 boards
 - Modern "pinchers" using ESP32 and NFC stickers
 - Air quality monitoring with ESP32, alarm signalling
- Using machine learning to detect anomalies in IoT system data
- Various web visualizations of IoT sensor data
- Data analysis (anomaly detection using statistics or machine learning)
- Unit power testing (SPL over JMH)
- Dynamic profiling of a paired application, profiling in a constrained context
- Implementation of debugging support for the static analysis library
- Optimizing the state space explosion problem in test generation using model checker
- Parallelization and code optimization using ML (including LLM)

Contact

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3rd floor (office 309)

We want
YOU for our
projects...

