Software Development for Vacuum Controls – SCADA Functions Development

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Context – Vacuum at CERN

- With over 128km of vacuum chambers, CERN is home to the largest vacuum system in the world

- The underlying architecture comprises approximately
  - 15 000 pieces of control equipment
  - 300 Programmable Logic Controllers (PLCs)
  - 7 Supervisory Control and Data Acquisition (SCADA) servers

- Vacuum Control System
  - Vacuum Database (vacDB) contains information of all devices in the system
  - Device information is used to generate configuration files used by PLCs and PVSS (SCADA)
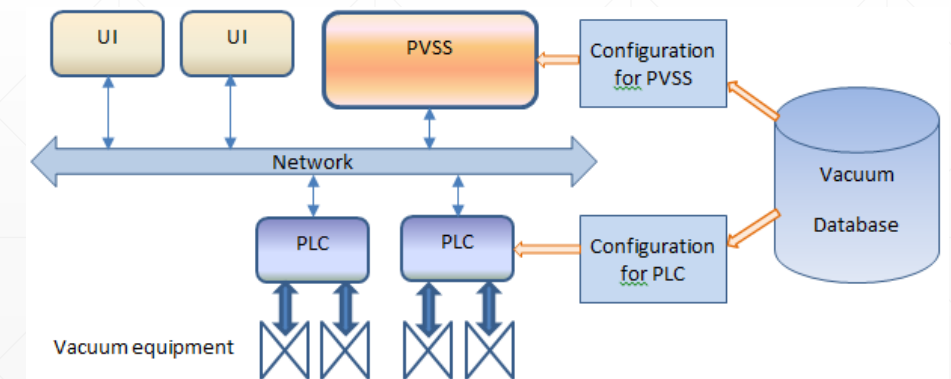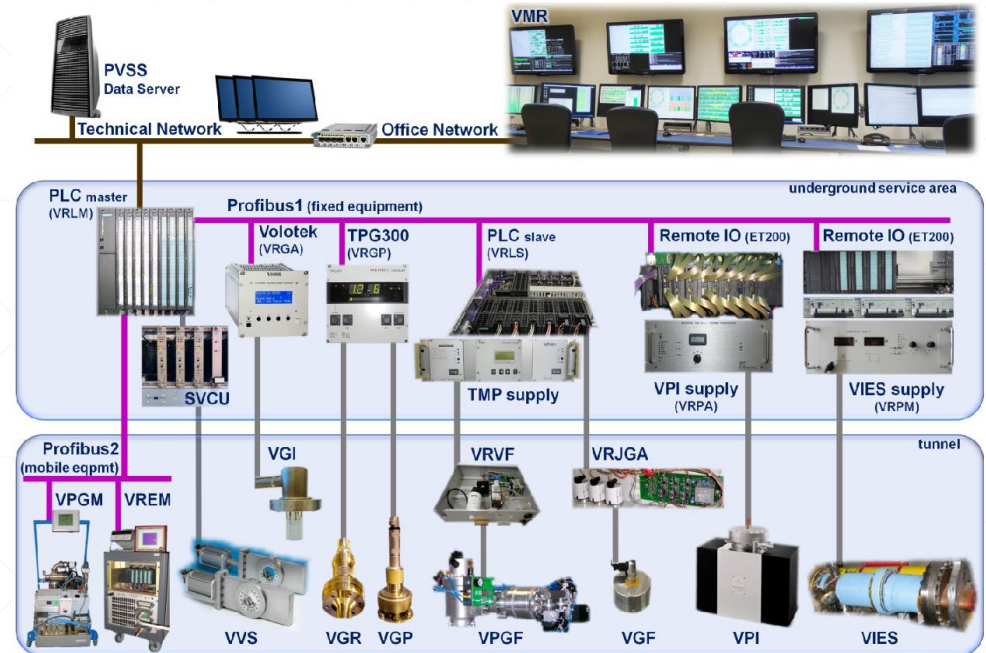
Vacuum Control System

- In order to modify vacDB (Vacuum Database) in a user friendly and safe way, 2 applications (the vacuum DB editors) were developed over 15 years ago
  - Master DB Editor – Edit metadata common to all machine databases
    - Some examples are: Attribute Types, Data Point Types, Control Types, etc.
  - vacCC (Vacuum Control Configurator) – Integrate and modify the vacuum devices within the control system
    - Export configuration files for the communication between vacuum devices and the supervision system
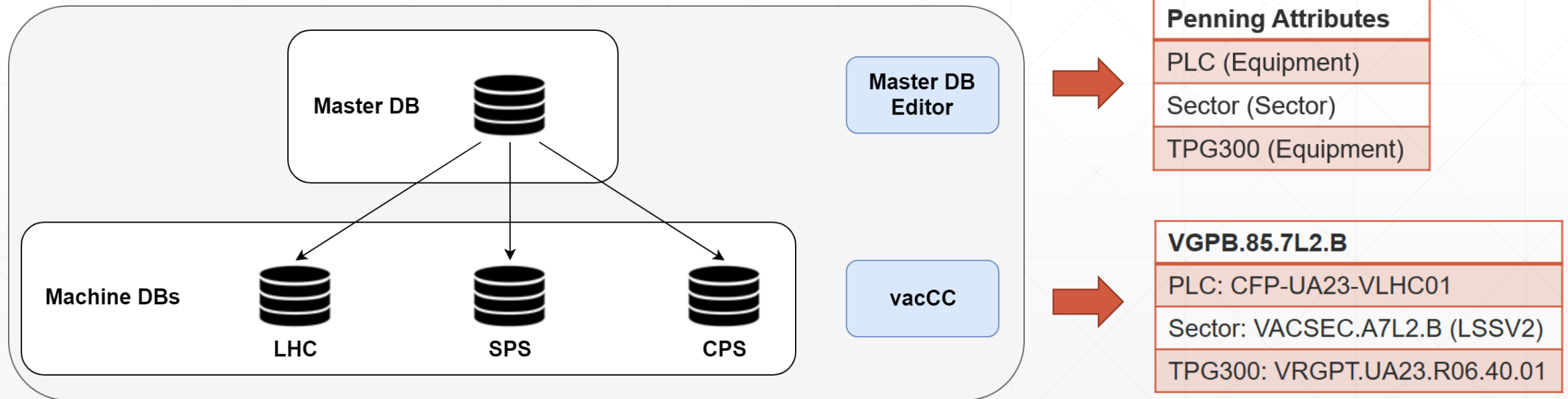
Team Integration and Framework Familiarization

- To familiarize myself with the Vacuum Control System Framework I started to do some bug fixes and improvements in vacCC application

- My main project is the renovation of the Master DB Editor. Some of the tasks already concluded are:
  - Produced a database analysis document
  - Studied the design of the legacy Master DB Editor
  - Produced a diagram of the database schema

Software Development

- Built Continuous Integration pipelines
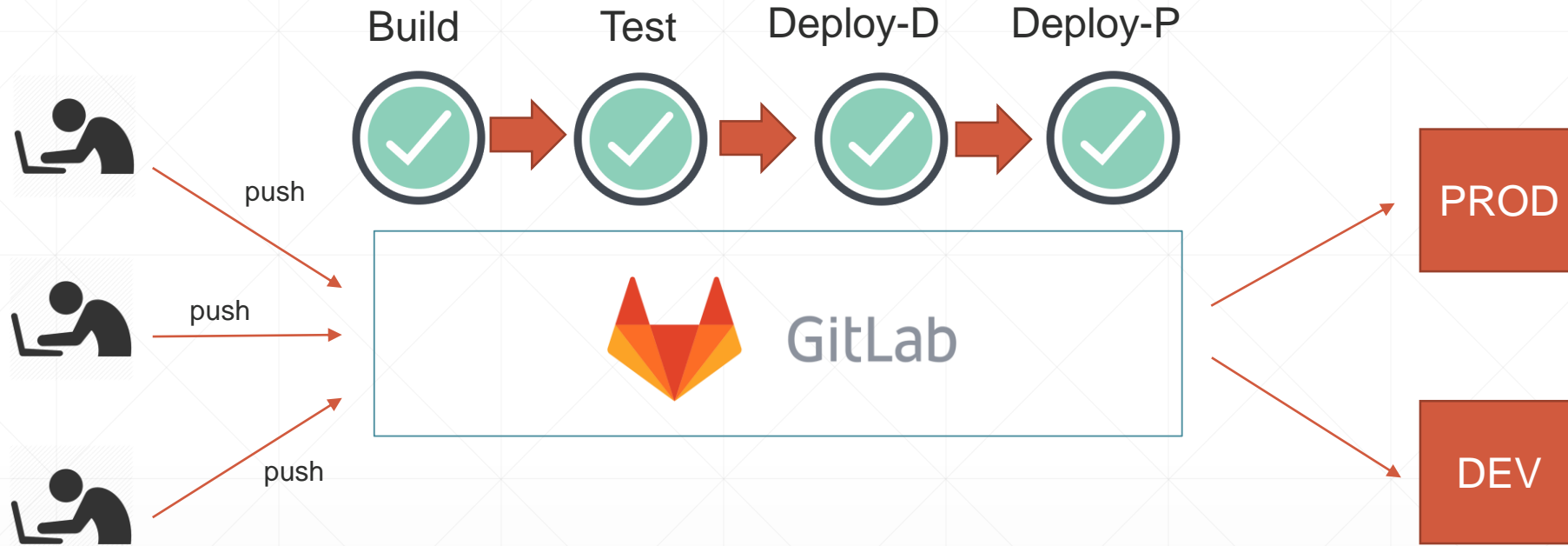
- Built the first skeleton of the application. Built both backend and frontend, as well as security features

- Built functioning prototypes using two different frontend UI frameworks
  - Analyzed both versions in order to pick the most appropriate one for the rest of the development

Projects – Master DB Editor

- "DP Types & Dpe" page on Master DB Editor

Projects – Master DB Editor Web

- "DP Types & Dpe" page on Master DB Editor Web

Experience/Personal Development

- New technologies
  - Java Frameworks (Spring Boot)
  - Continuous Integration – Automatic deployment to test and production
  - Deployment (openshift, docker containers)
  - Front-End Frameworks (ReactJS)
  - WinCC-OA

- New methodologies
  - Project Planning (Project Management Professional Guidelines)
  - Agile Methodologies (Scrum)
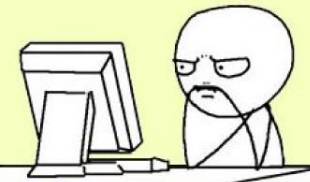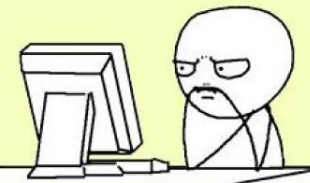
Training Courses

- Spring & Hibernate for Beginners (May 22, 2019)

- Full Stack Project: Spring Boot 2.0, ReactJS, Redux (June 6, 2019)

- Just enrolled on French Course

Future Work

- Complete Master DB Editor Renovation

Milestone	Expected Completion Date
Project Planning	August 2019
Analysis of Legacy Master DB Editor	August 2019
Software Development	February 2020
Testing	March 2020
Documentation	May 2020

- New Diagnostic tools for vacuum SCADA

  - SMS notifications feature

  - Vacuum monitoring room diagnostics enhancement

- vacDM enhancements and refactor into a Micro-Services architecture