



Production Line Data Analysis

Team sdmay18-32
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Background

Danfoss is a company that specializes in industrial manufacturing. Their products range from automotive to food processing parts. For years, they gathered data related to production of their product lines - some automated, and some manually.

Problem

Currently, the data being collected about production is spread throughout several databases, and is a combination of automatic collection and manual collection. Making deductions based on any of it is tedious, and perhaps unreliable at best.

Solution

To streamline the collection of data, a more centralized and automated system must be created. This means removing as much human error as possible by centralizing the data to one database, and automatically displaying data insights in one place.

Requirements

Functional

- *Display Data* - First pass yield, Overall effective efficiency, overall production efficiency, etc.
- *Analytics* - Number crunching is done by cloud-based servers
- *Alerting* - warnings will be displayed upon hitting certain data thresholds
- *Interactivity* - employee interfaces must connect to the system

Non-Functional

- *Performant* - data and visuals should update in real-time
- *Security* - completely internal
- *Stable* - the system has high up-time
- *Scalable* - While the project will be tested over on production line data set, the program framework must scale
- *Documentation* - Documentation must be provided to inform users and developers

General

- *Users*
 - Assembly line management
 - Assembly line workers
- *Environment* - the assembly line floor.

Design Approach

Block Diagram Modules

- *Client* - The user's machine.
- *Server* - The central ignition backend.
- *Database* - data storage

Client

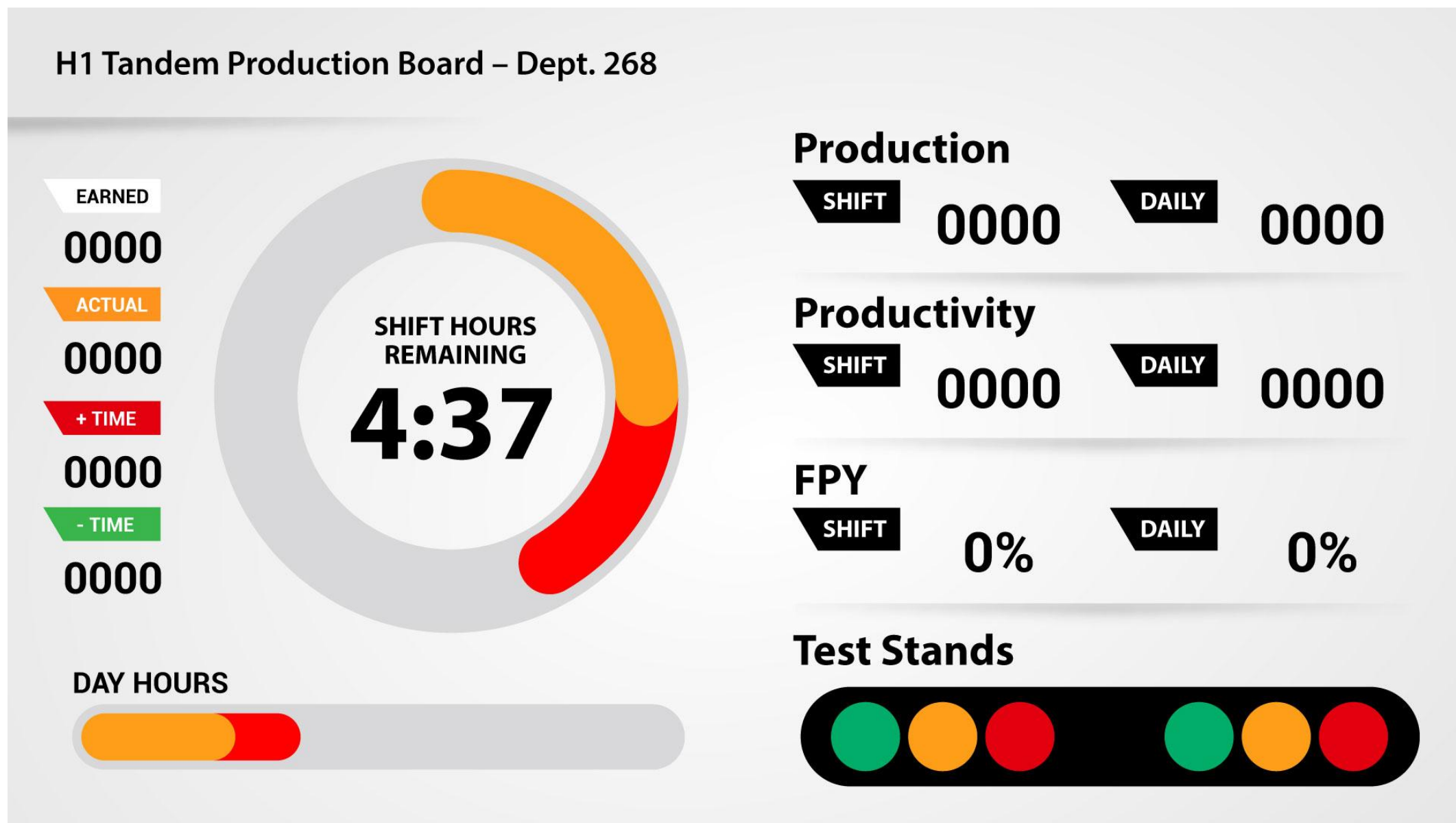
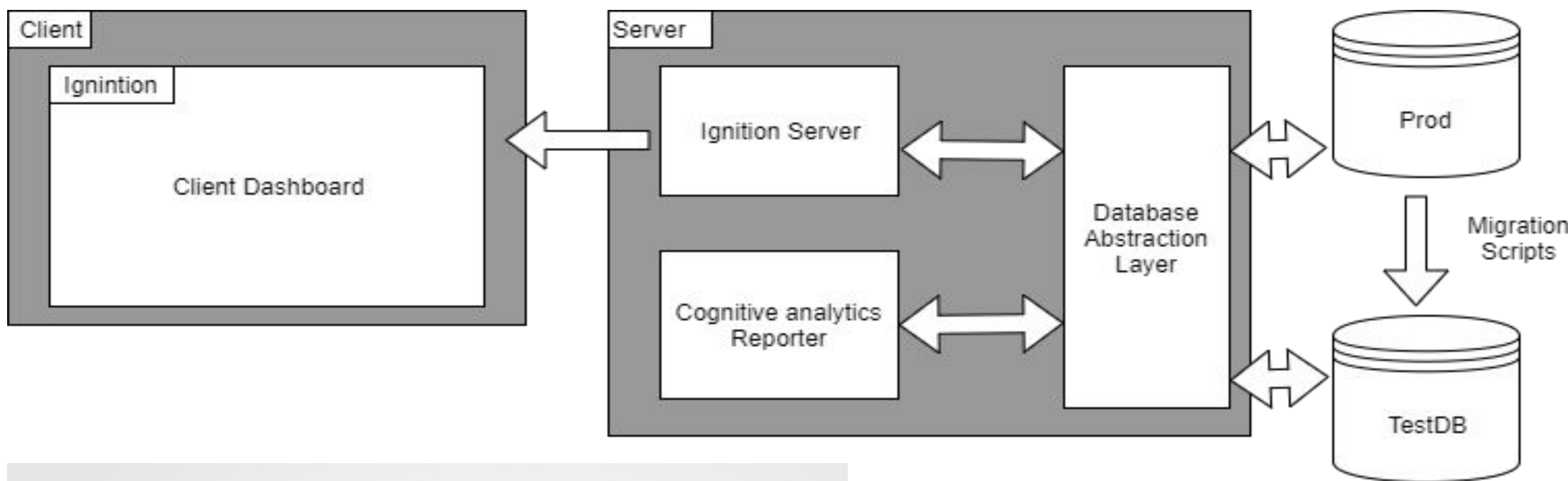
- *Client Dashboard* - The dashboard running in Ignition.

Server

- *Ignition server* - The central Ignition backend.
- *Database Abstraction* - The layer allowing us to connect ignition to multiple different types of databases.

Database

- *Production* - The database fed with data from the production lines.
- *Test* - A test DB on campus for easy access.



Above:
System Block Diagram

Left:
Main data display dashboard design (provided by Danfoss)

Technical Details

Danfoss Stack

- Database - decentralized, used for data storage
- Ignition - currently used for a number of internal data displays

Team Stack

- Server - 2 GTX 1080 Ti
- MySQL - offsite, non-production, centralized data storage
- Ignition - used by Danfoss, and portable
- Python - used in Ignition scripting
- TensorFlow - used for machine learning initial analysis

