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3D Printer Scheduler Architecture

System for maintaining order on a print farm.

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1 Introduction

A year later and business has been booming. The scheduler did its work and allowed Jack to increase the amount of prints he could produce per month. As time went on more printers were added, the webshop was expanded and Jack was able to hire someone to operate the 3d printers.

Things are looking good, and he is thinking about opening a second location with printers. Additionally, he would like to somehow tie orders from the webshop directly into the printers.

Lastly while manually operating the printers is great, he'd like to get to a point where printers are controlled centrally rather than activated manually. Just the removal of the print and spool changes need to be done manually. But a new print is just immediately started.

2 Background information – Centrally controlled printers

Jack put some research into the best way to control the servers. The most cost-effective method was to get computers with mainboards that have 24 USB ports which can then be networked. He would need about 5 of these computers for each printer farm.

Software exists (and is supplied) that can control the printers. This software has a Java interface and accepts a print name, color and material and will give an id back if the print is successfully added to the queue. It does not send a signal back but simply lists all the completed prints.

3 Background Information – Updated organization

The future organization will have three separate locations. There is a print farm situated in Enschede which is on an industrial area and just a large warehouse. There is print farm situated in Amsterdam (well technically the outskirts) similarly in a large rented space. And Jack has an administrative office in Deventer.

They also have a VPS with TransIP on which the webshop (also supplied) software currently runs. They have full administrative access to it and there is enough additional capacity available for possible extra software to run there.

Both print farms have around 100 printers each and at least 2 people present at any hour operating in shifts. Rather than having a dedicated pc, each employee has a tablet with which they can manage the print scheduler. The tablet application also gives alerts when a printer is done.

4 Basic program operation

Orders coming into the webshop should automatically be forwarded to one of the print farms. In case of shipping it doesn't matter, if people want to pickup in person it does matter which print farm it goes to.

When a print is done the webshop should get a signal letting it know the print is ready for shipping/pickup. People at the print farm are alerted what the labeling and packaging should be when they remove the print from the printer.

Printer statistics are tracked as Jack wants to get an idea of how printers are doing and what is getting printed a lot.

5 Requirements

The following requirements were created for the new expanded business model. A lot of the general operation remains the same, except that when a printer is marked ready the system will initiate the new print.

5.1 Business requirements

Code	Description
B1	Allow the business to operate with multiple employees.
B2	Expand production and productivity.

5.2 User requirements

Code	Description	Source
U1	Employee gets a signal when a print is done.	B2
U2	Employee can register a printer as ready.	B2
U3	Customers can order via the webshop.	B2
U4	Owner can get an overview of print statistics.	B2
U5	Employee can tell who a print is for when it is done.	B1

5.3 System Requirements*

You can already tell that system requirements are incomplete and only non-functional. This is because the system requirements are also informed by the proposed architectural design.

Non-Functional

Code	Description	Source
NF1	Employees can use the system via a tablet.	B1
NF2	Controls should be available from different devices and locations.	

6 Assignment

- Model the software as described in the user requirements.
- Design the architecture for this entire system based on the user requirements.
    - It should be obvious from the diagrams what hardware and software is involved, how these interact, and how processes flow within the architecture.
    - At the very least there should be an activity diagram for ordering a print.
    - But this should not be the only diagram you make.