

# CS 461 - CS Senior Capstone

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## Problem Statement

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### **Abstract**

Ninkasi is a brewing company based in Eugene, Oregon that produces tens of thousands of barrels of beer every year and distributes to many locations across America and Canada. To maintain high quality and ensure a consistent product, breweries must be detail oriented and organized in its manufacturing process. Each brewery has its own unique approach to its brewing process, and as such, require unique methods of tracking data. Ninkasi is currently tracking its brewery data on spreadsheets, which is a laborious, time consuming and error prone process. The aim of this project is to create software for the brewery operations management team to add and monitor brewing data. This software will be utilized by brewing and cellar team members to input and receive feedback within seconds and access the most up to date information on the brewing process.

## I. PROBLEM

- The data generated by the company is too big for its current data storage system
  - The spreadsheets holding the brewing data becomes quickly difficult to manage. The more Ninkasi produces, the worse the problem becomes.
- Relying on "paper logs" and "manual data entry into ... digital spreadsheet"
  - Paper logs are fragile and bound to a single location in space. Entering paper logs into a digital spreadsheet is redundant labor.
- Data logging process is "time consuming" and "prone to errors"
  - Paper logs require manual entry and retrieval, likely increases error in the data. Inconsistencies in data provides a murky view of the brewing process and this ambiguity leads to more employee hours spent error correcting and attempting to read through bad data. Beer is brewed in large batches and a little mistake can affect thousands of gallons of beer. Without accurate measurements and systems in place to handle issues, batches of product may unintentionally vary in consistency.
- "Confusion and delays in receiving ... time sensitive information"
  - Breweries require constant monitoring of brewing processes and quick feedback. Batches of product need to continue processing until they hit certain benchmarks <sup>1</sup>, after which the product moves to the next stage of brewing. Missing these critical points can cost <sup>2</sup> breweries time and money. Automating these system checks and pipelining information from process to process can reduce errors in the brewing process and provide a brewing process with less friction points.
- Data points are missed or incorrectly collected
  - Automating data collection will allow Ninkasi to specify information pipelines to properly handle all data <sup>3</sup>. This will prevent missed data points and reduce error within the data <sup>4</sup>. Since data is routinely run through their statistical analysis unit, it is vital that the information is correct so that accurate conclusions may be created.
- Process and production delays are not communicated "until it is too late"
  - This requires employees to redo work to correct for mistakes and creates dependency stopping points.
- Infrequent and inaccurate data can lead to unclear pictures of the product
  - When the brewery gets the data accurately and quickly, more educated decisions can be made in a more timely manner.
- Holding all brewing data in a spreadsheet is unstable
  - It is easy for someone to accidentally delete something or place data in the wrong place.

<sup>1</sup>define these benchmarks

<sup>2</sup>define cost

<sup>3</sup>properly handle data is a loose term

<sup>4</sup>error reduction can be used as a measurement of success, but a measurement of how much error exists needs to first be measured to know what improvement looks like

## II. PROPOSED SOLUTION

The software built to suit their needs for data flow, storage and access requires that it be adaptable to a wide variety of screen sizes and mobility ranging from desktop computing to convenient methods of entering and displaying data on the cell phone or tablet. Given that most of the data interaction will take place through mobile devices, it was originally requested that an app for send mobile devices would be built. However, building an application for iOS and for android would be labor and time intensive, while simultaneously being limiting on the number of operating systems they can run on. Developing mobile applications excludes any desktop or laptop devices, and being able to utilize the extra screen real-estate is beneficial for data visualization and comparison. The proposed solution is to construct a web app that would be compatible with a wide range of devices. This web app will link to a Ninkasi database, receive manual and automatic input of data into the database, and provide a user-friendly interface for all employees accessing and managing the data.

## III. SYSTEM OBJECTIVES

- Reduce manual data entry to one entry per data point
  - Our system will allow brewers to monitor the brewing process from a wide variety of devices from desktops to phones. Creating processing pipelines that peripheral instruments and sensors send data to will allow us to consolidate information and present it in a singular interface to the brewers. This will ensure brewers interact with data through one entry point.
- Eliminate sharing of production data and reports via excel and email
  - Instead of requiring brewers to email reports, our system will provide a shared interface that each person can log in to. Creating a shared drive of information and developing a user interface to present this information will eliminate the need to email production data and reports.
- Eliminate paper tracking logs with updates that can accessed from any device
  - Automating data collection processes will eliminate paper tracking logs. A web application built for Ninkasi servers will allow brewers to access up-to-date information from any devices. We can also build in security restrictions to ensure only Ninkasi approved devices have access to network information.

## IV. DELIVERABLES

Our comprehensive solution will include a web application to serve as an interface for the brewing operations management system. We will deploy this application on the Ninkasi network. The application will use database information to generate reports and monitor brewing processes. During the brewing process, our system will generate flags when issues arise and alert necessary brewers of pertinent information. Behind the scene, our system will interface with brewing sensors to pipeline data from collection to proper database locations, allowing for timely information. Overall, this system will reduce manual data entry to a single interface, eliminate sharing of daily production data and reports via excel and email, eliminate manual entry and transfer of data, and eliminate paper tracking logs to ensure important information is always up-to-date.

## V. METRICS

- Reduce brewer interaction with data to singular piece of software
- Allow brewers to view reports within system interface

- Eliminate paper tracking logs
- Eliminate manual copying of data between spreadsheets

## VI. CLARIFICATIONS

### 1) Existing Solutions:

- <https://www.orchestratedbeer.com/>
- <http://ekosbrewmaster.com/>
- <https://inductiveautomation.com/scada-software>
- <https://www.nwasoft.com/industries/food>

### 2) Quotations taken from the brewing operations management team description<sup>5</sup>

<sup>5</sup><http://eecs.oregonstate.edu/capstone/cs/capstone.cgi?project=403>