Littlefield Brewery

By BeerBoyz (ESA Team 16)

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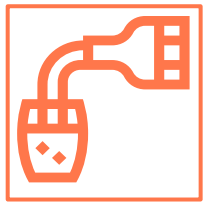
Video

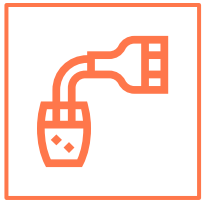
System Inputs



Customer Demand

The system will randomly generate customer demand

Outputs



Demand Lost

Number of Customers Lost

Profit (used for leaderboard)

Overall Revenue from Beers - Operating and Material Costs + interest accrued

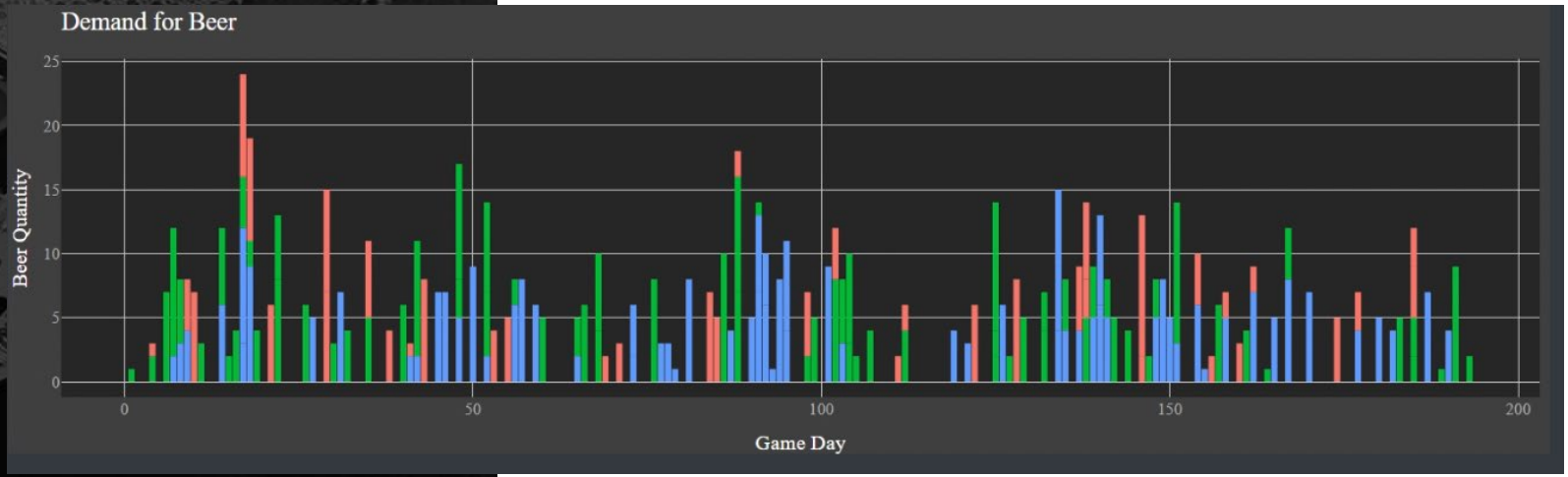
Demand Generation

Customer *j* demand for **Beer *i*** modelled as Normal Distribution

$$X_{ij} \sim N(D_{ij}, \sigma_{ij}^2)$$

Notation

- D_{ij} : Customer *j's* average demand for Beer *i*
- σ_{ij} : Customer *j's* standard deviation in demand for Beer *i*
- X_{ij} : Random Variable representing customer *j's* demand for beer *i*



Recap... How does a Brewery work?

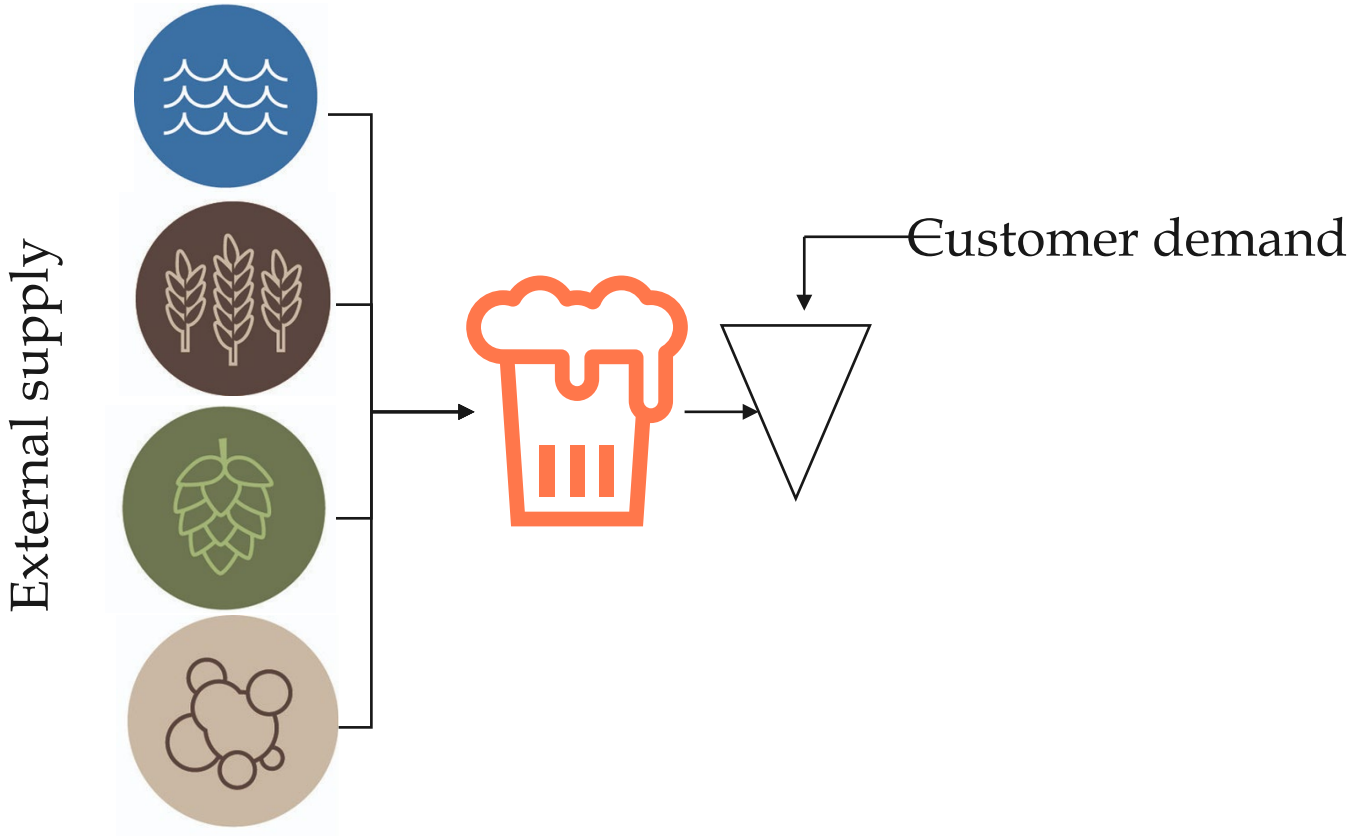
Take the Raw Materials

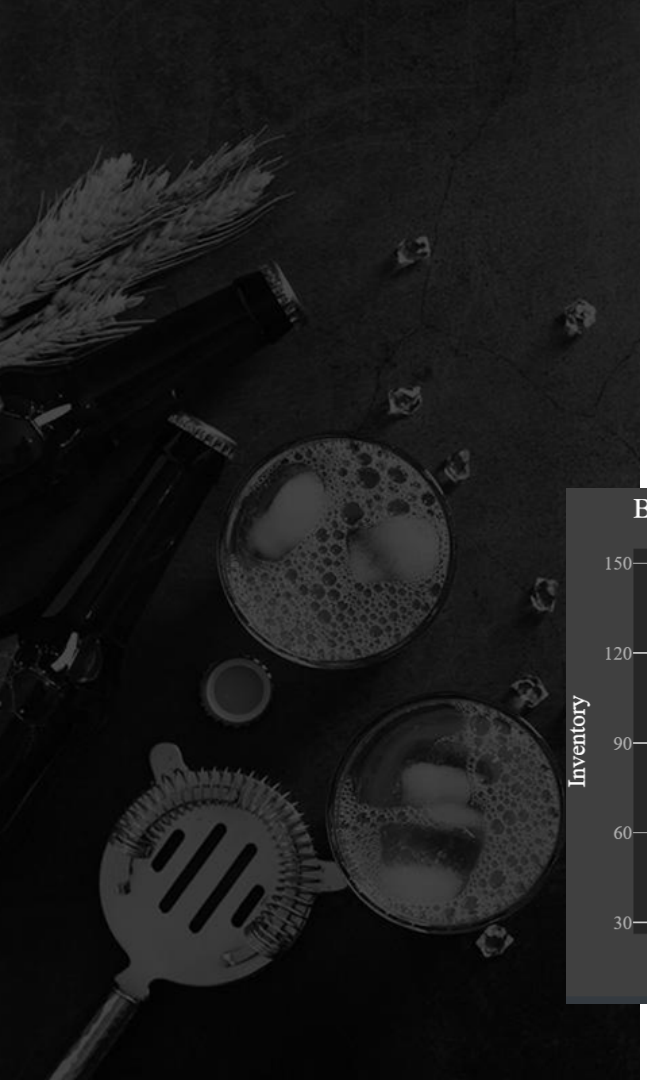
Water + Malt + Hops + Yeast

+Time in a fermentation tank

A Fresh Glass of Beer! ☺

Material Requirement Planning (MRP)





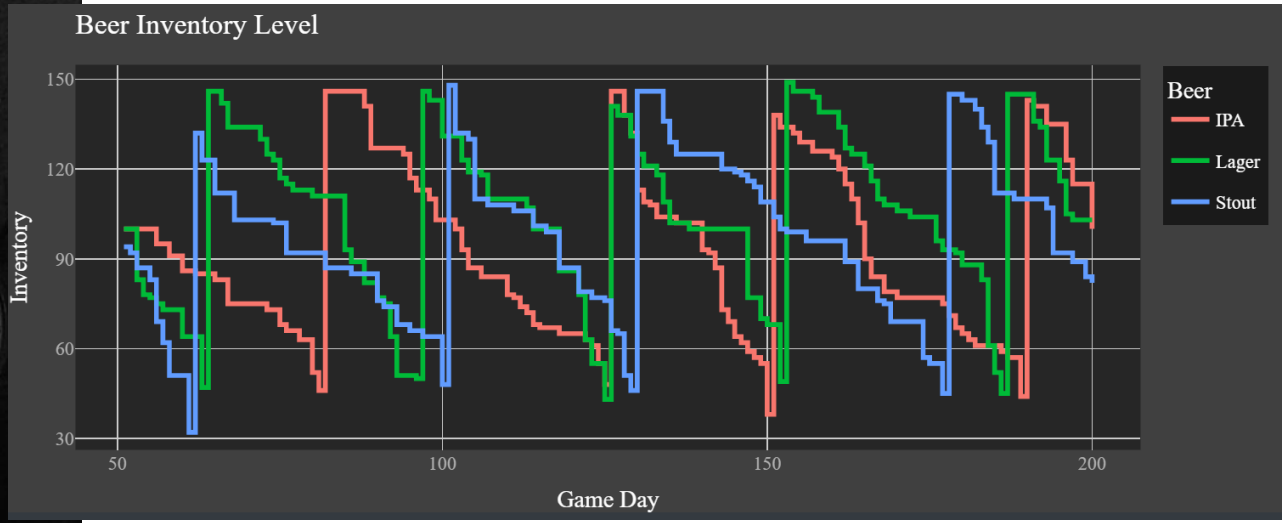
(Q,r) Model

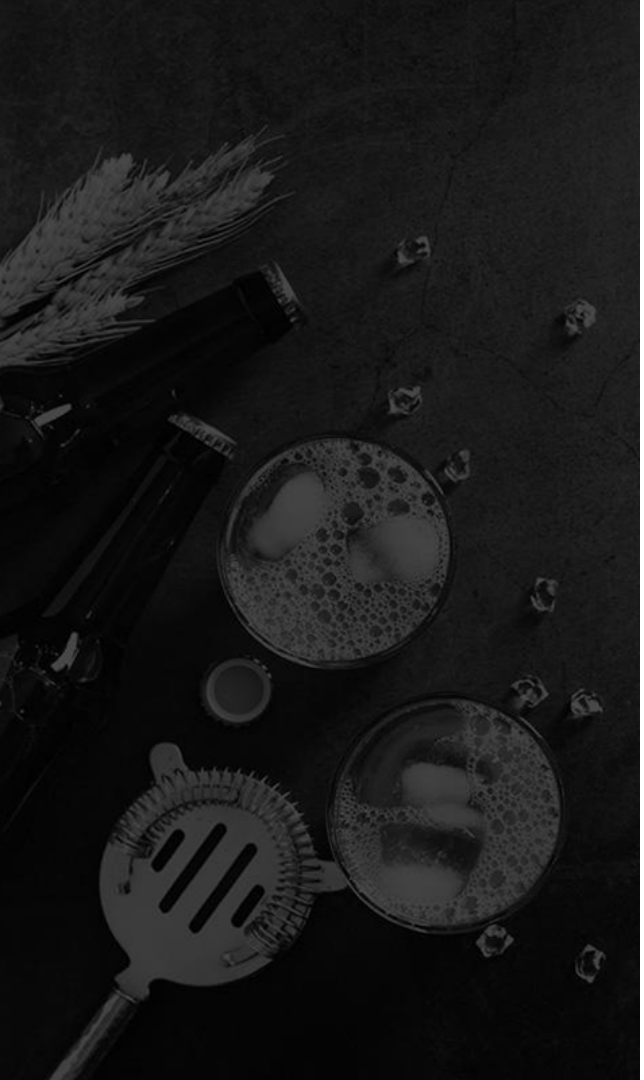
Manage

- Reorder Quantity
- Reorder Point

Achieve

- Maximize Profit
- Manage Inventory





Possible Improvement for MSO Concept

We can learn from the game

- Materials Requirements Planning (MRP)
- (Q, r) Model concepts

We could also add

- Inclusion of queuing analysis as well!

Concept Combination

Materials Requirements Planning

Automation & (Q, r) models

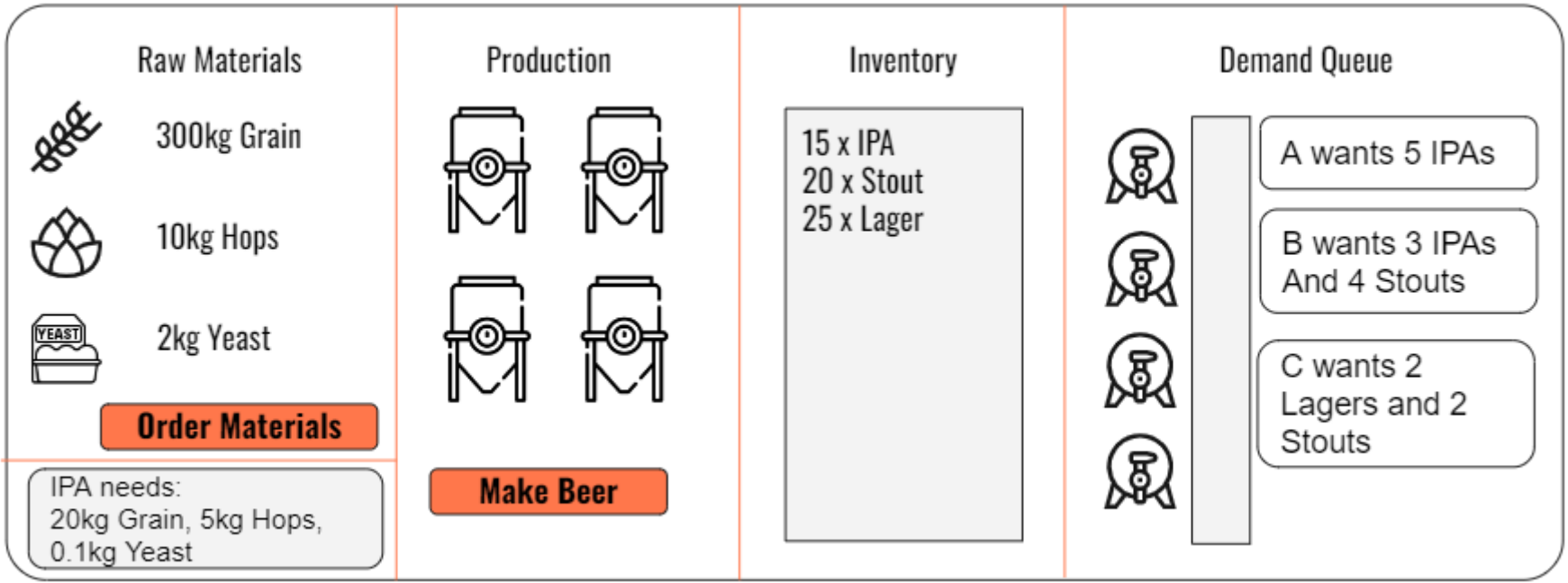
Fun & Complex Game!

MSO Problem Statement

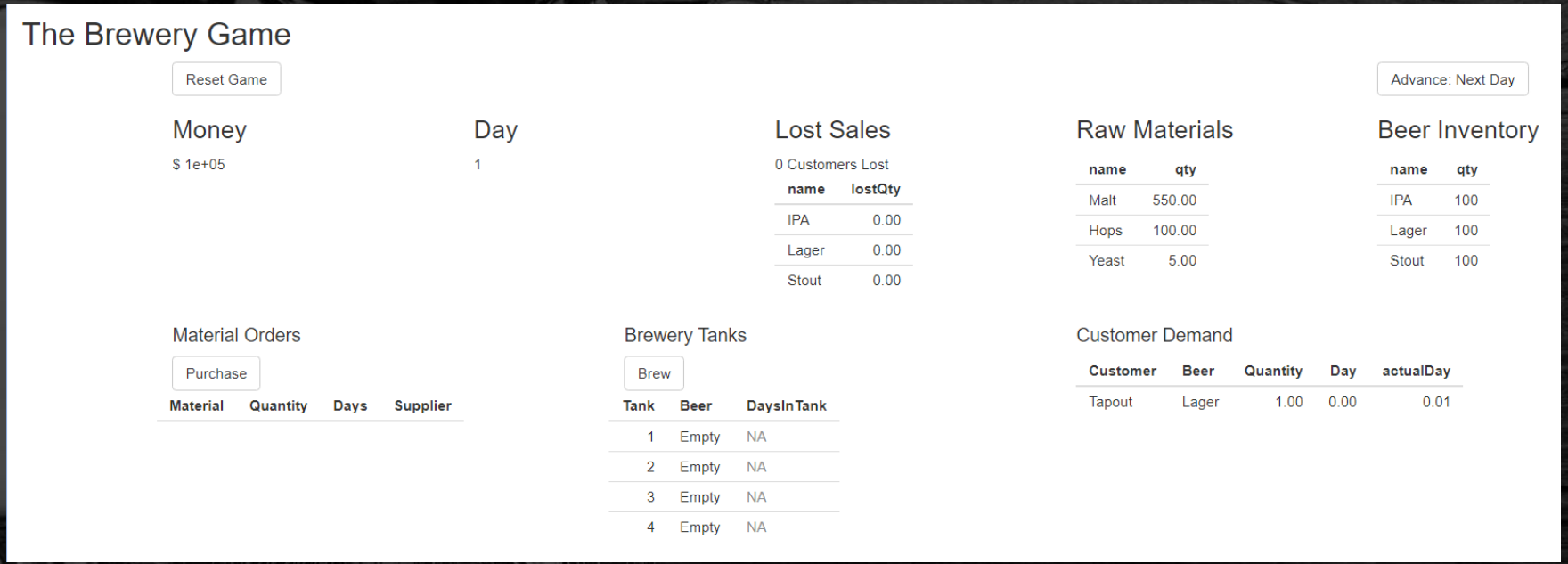
"How might we optimize our efficiency of making the beer while minimizing our cost and maximizing customer satisfaction?"

Frontend UI

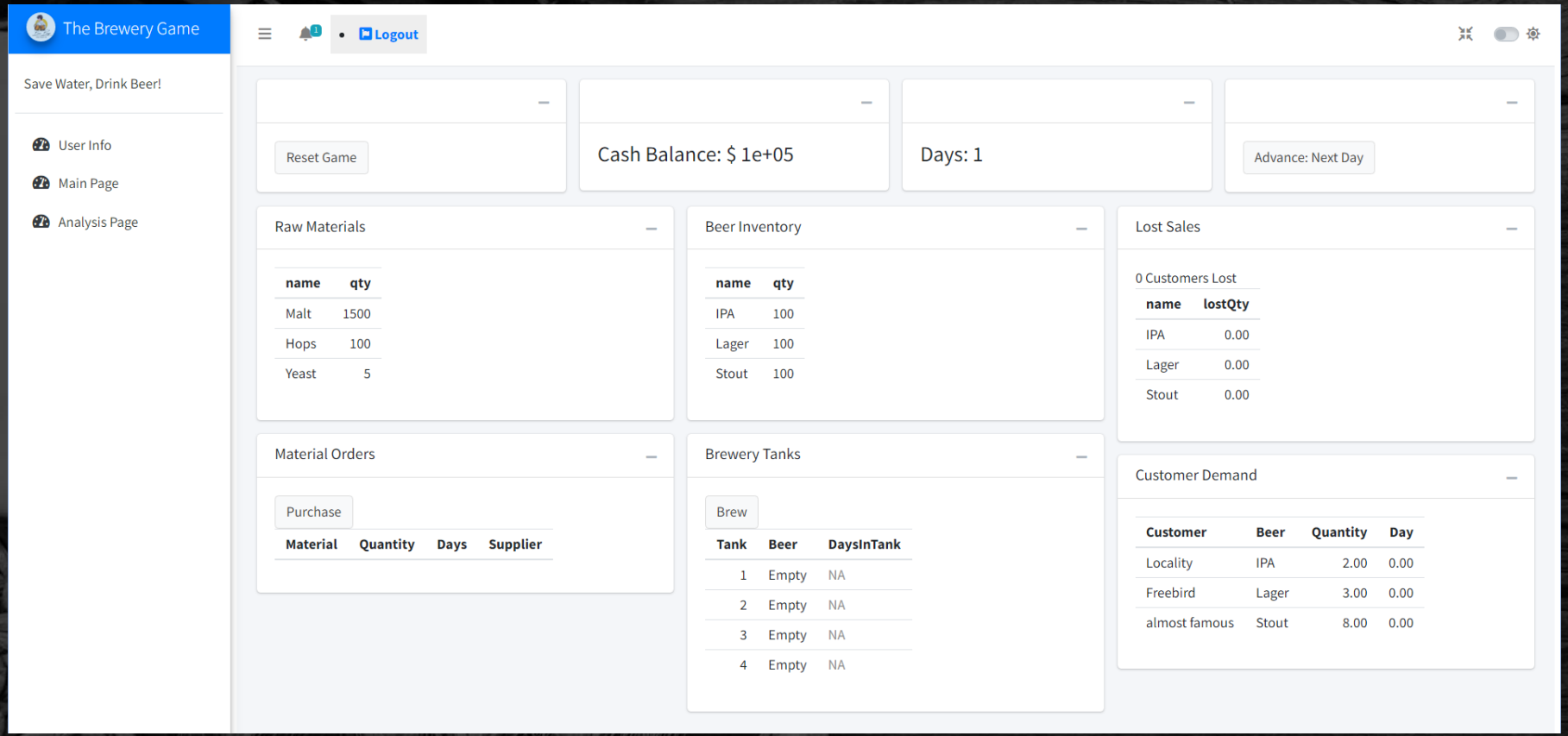
Frontend UI: Initial Prototype



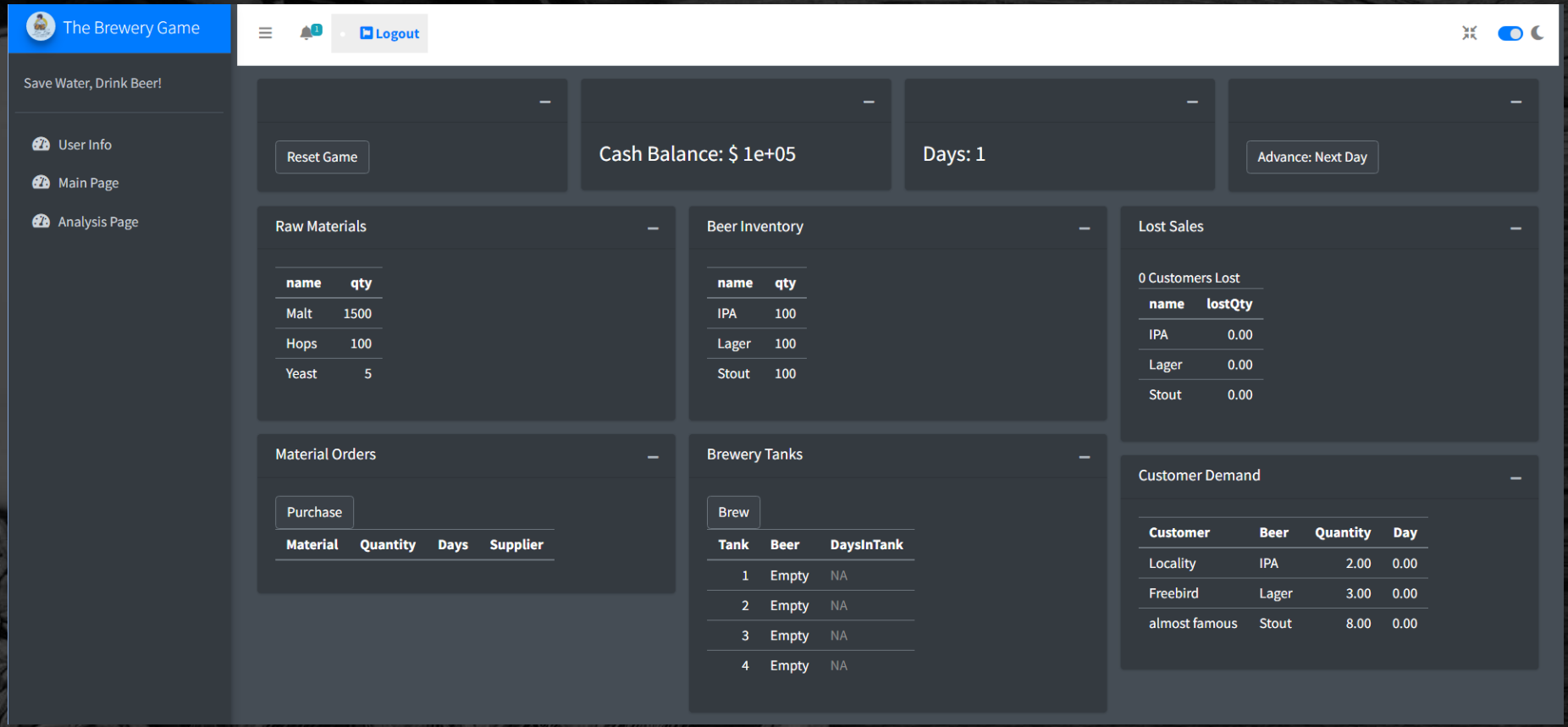
Week 8 & 9- Further Organisation



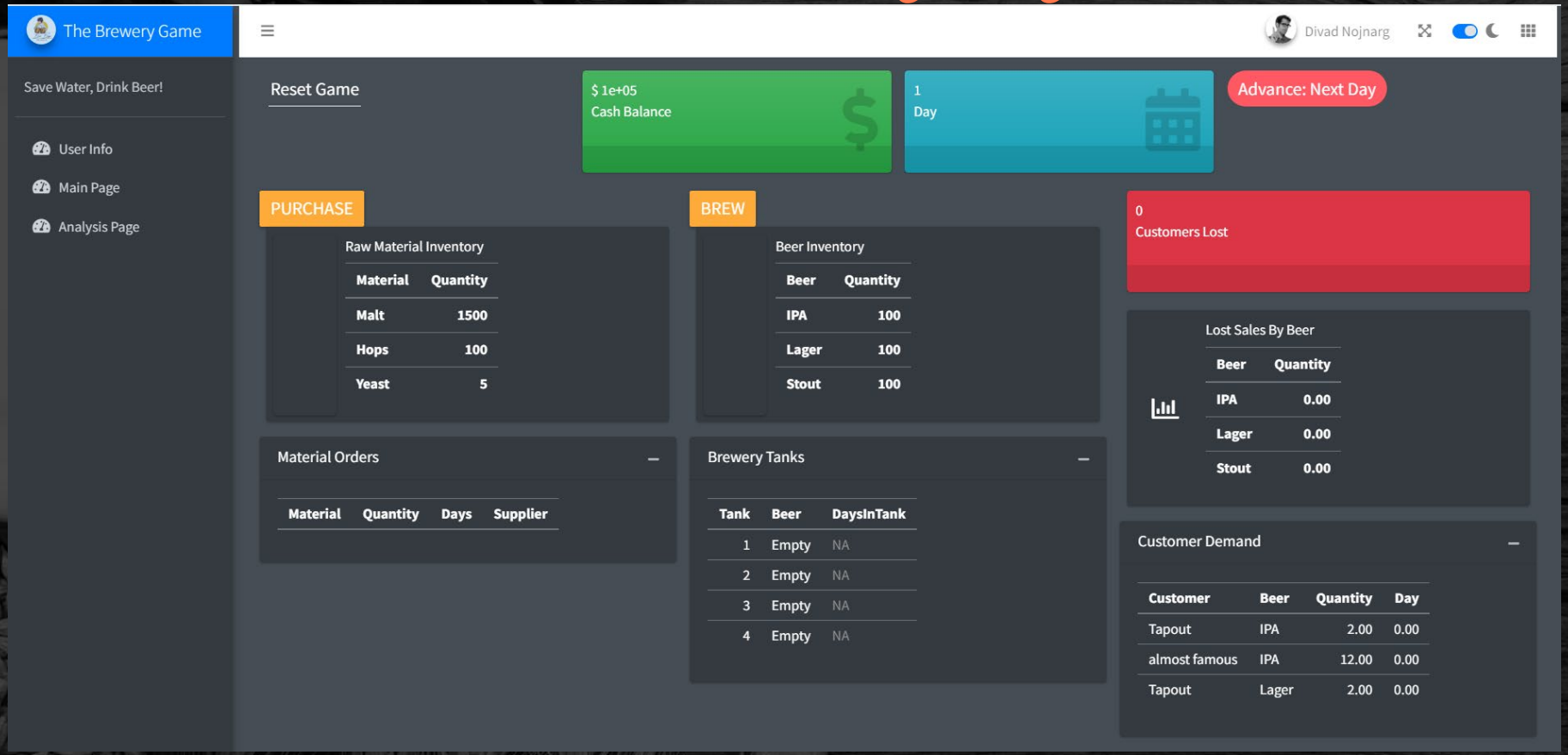
Week 10- Using Bs4Dash



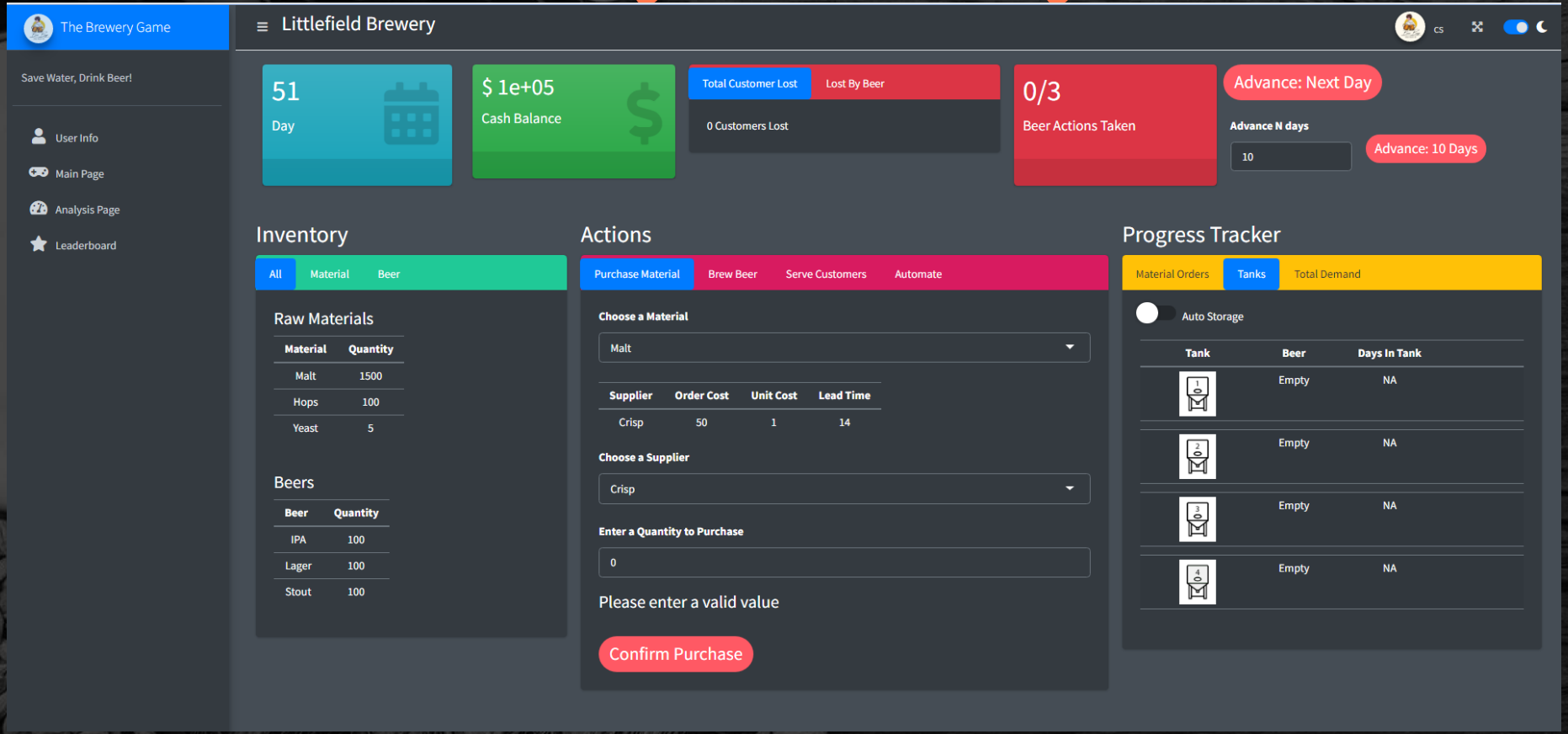
Dark Mode ☺


The Brewery Game
Save Water, Drink Beer!
User Info
Main Page
Analysis Page
Logout
Reset Game
Cash Balance: $ 1e+05
Days: 1
Advance: Next Day
Raw Materials
name qty
Malt 1500
Hops 100
Yeast 5
Beer Inventory
name qty
IPA 100
Lager 100
Stout 100
Lost Sales
0 Customers Lost
name lostQty
IPA 0.00
Lager 0.00
Stout 0.00
Material Orders
Purchase
Material Quantity Days Supplier
Brewery Tanks
Brew
Tank Beer DaysInTank
1 Empty NA
2 Empty NA
3 Empty NA
4 Empty NA
Customer Demand
Customer Beer Quantity Day
Locality IPA 2.00 0.00
Freebird Lager 3.00 0.00
almost famous Stout 8.00 0.00

Week 11: Styling

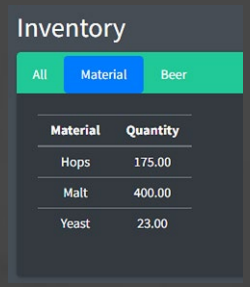


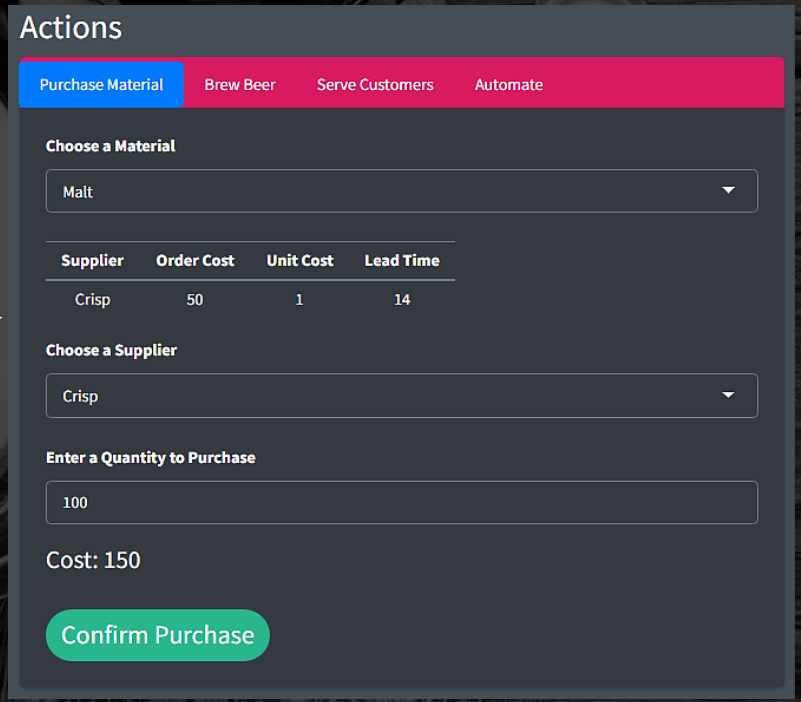
Week 12: Organisation of Actions

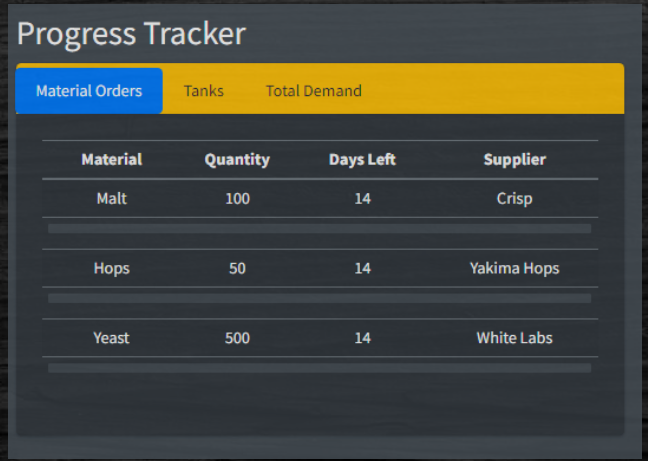


Backend

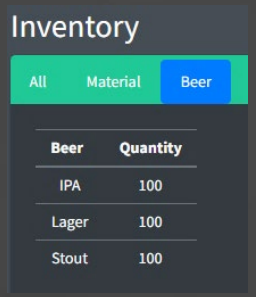
Manual Feature 1: Purchase Material

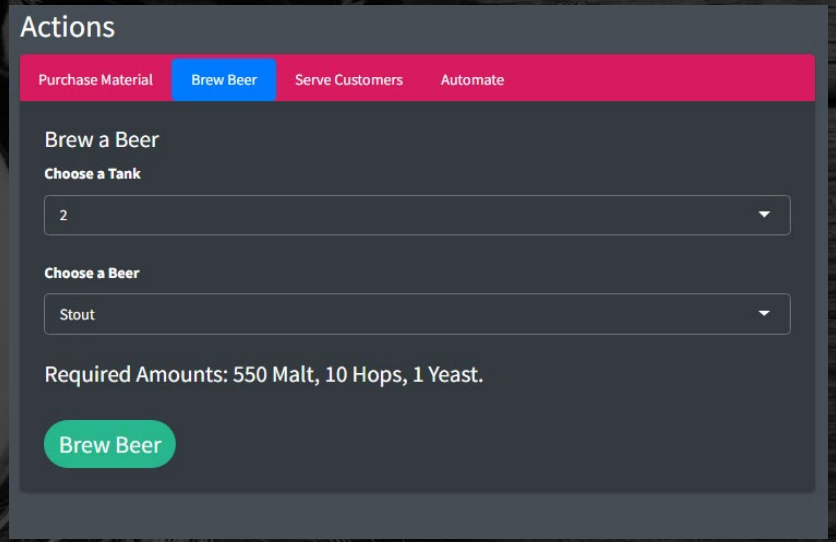


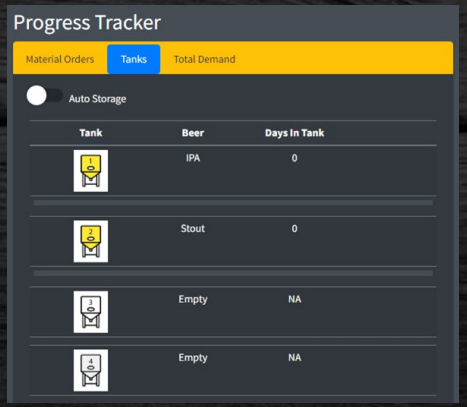


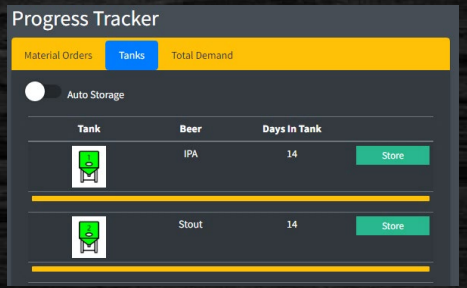


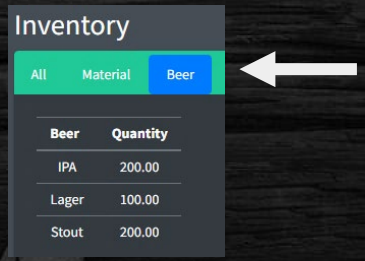
Manual Feature 2: Brew Beer



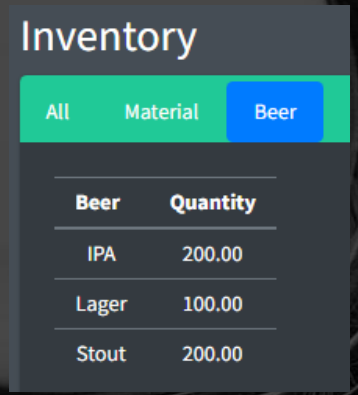


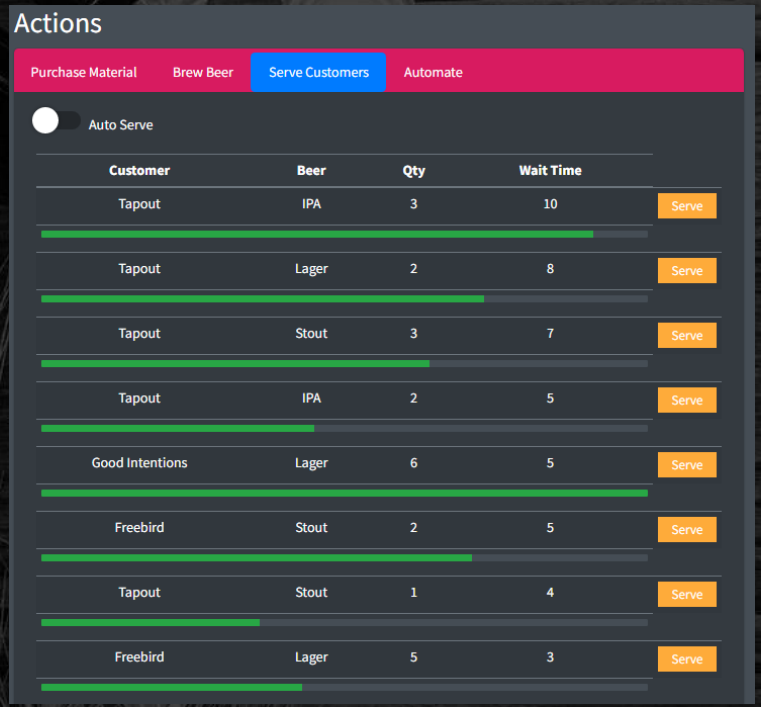


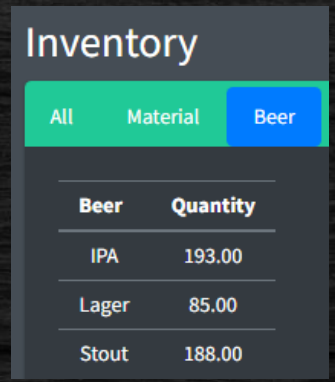




Manual Feature 3: Serving Customer

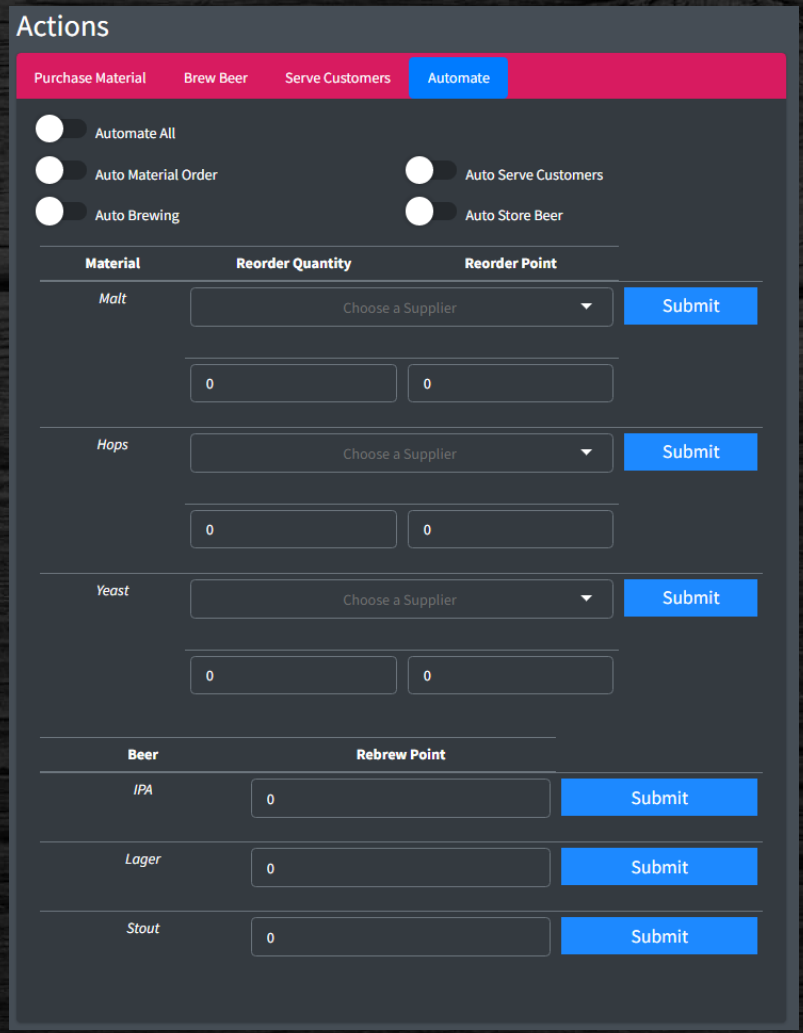






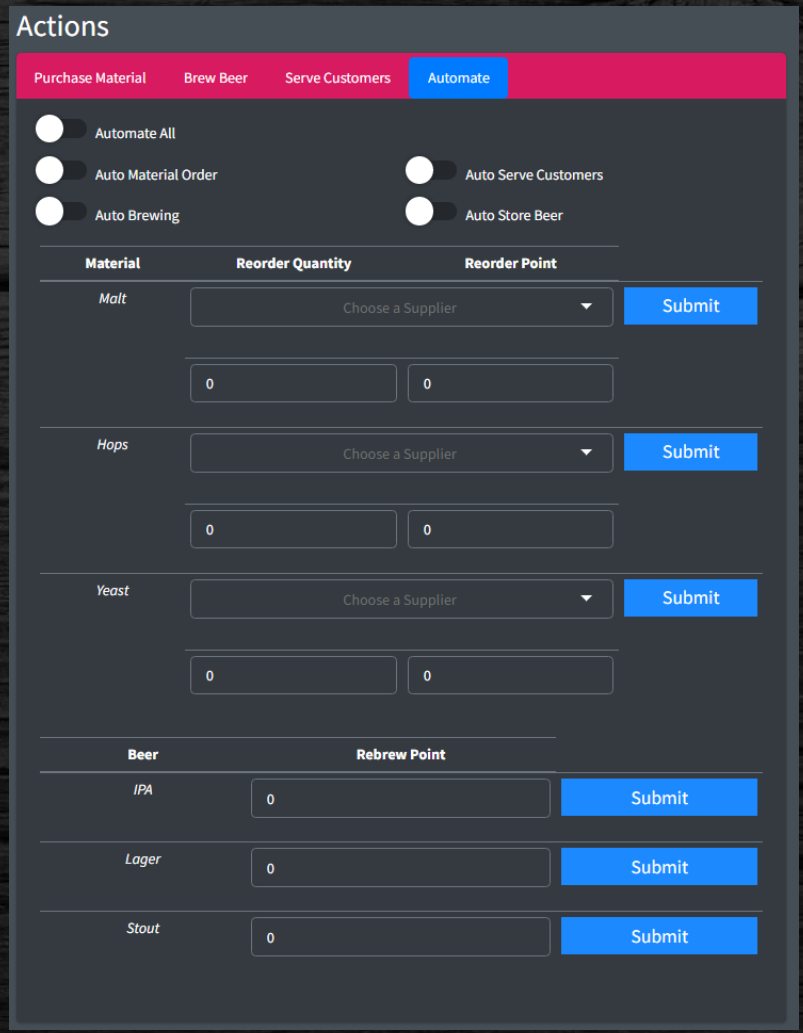
Additional Feature- Automation

- Reorder Quantity and Reorder Point for the Raw Materials used
- Brewing of beer to be automated once the inventory drops below the
- Rebrew Point
- Storage of beer
- Serving of customers



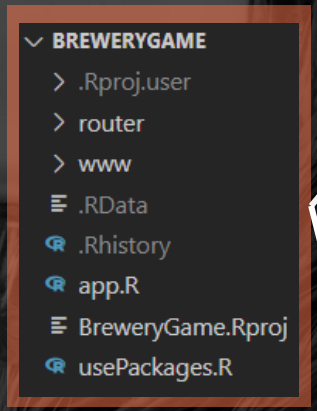
Additional Feature- Automation

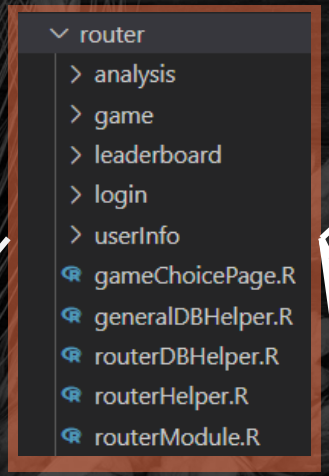
- Brings out the usefulness of the (Q, r) model concept
- Combines the Materials Assembly nature of brewing beer with the (Q, r) model

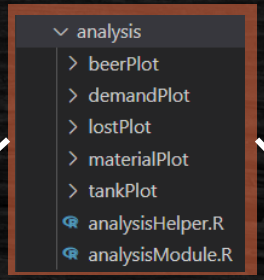


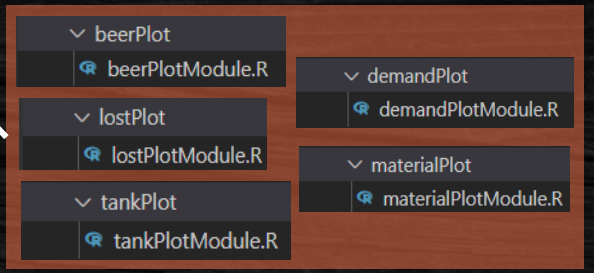
Code Organisation

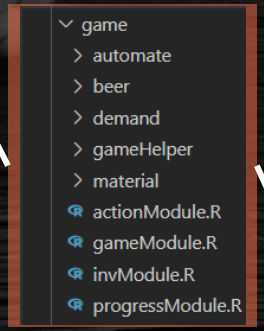
Powered by Shiny Modules

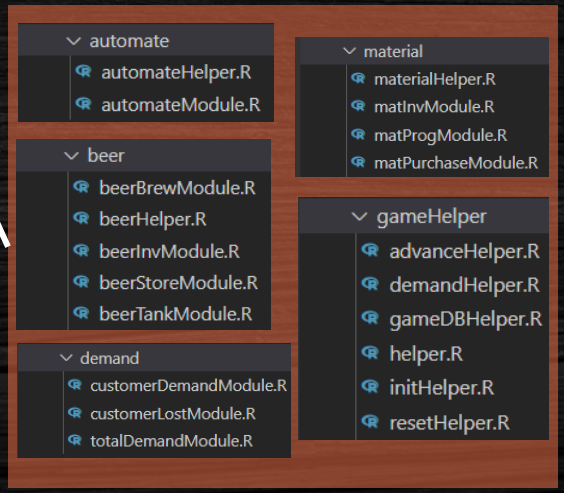


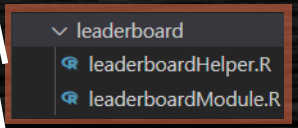


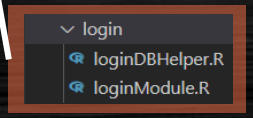


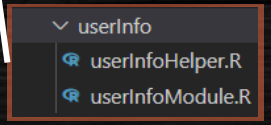


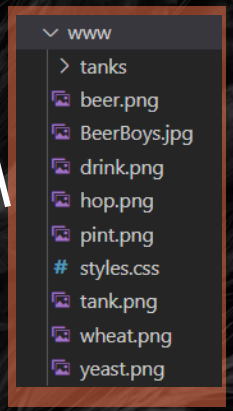


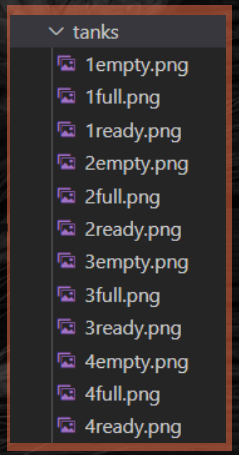




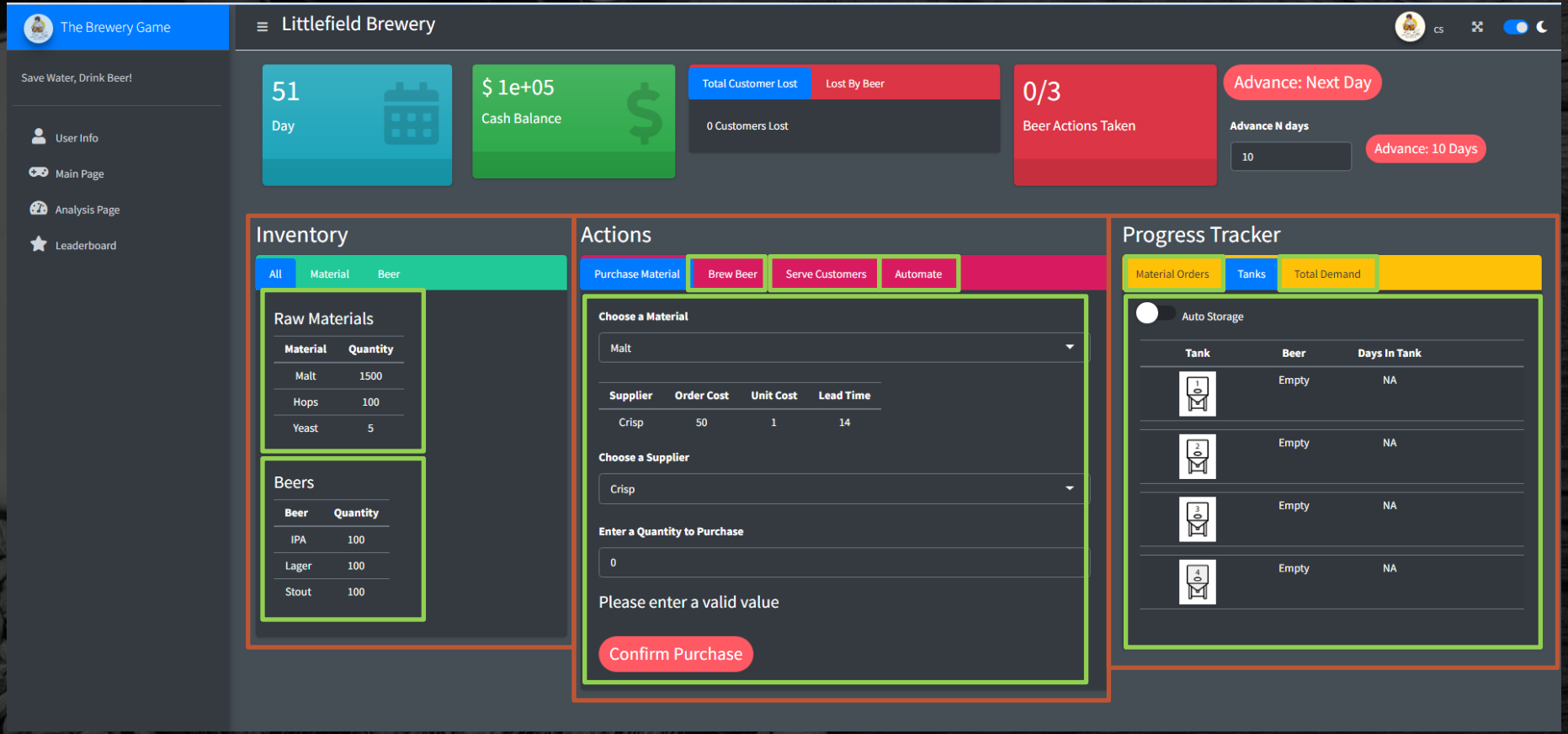




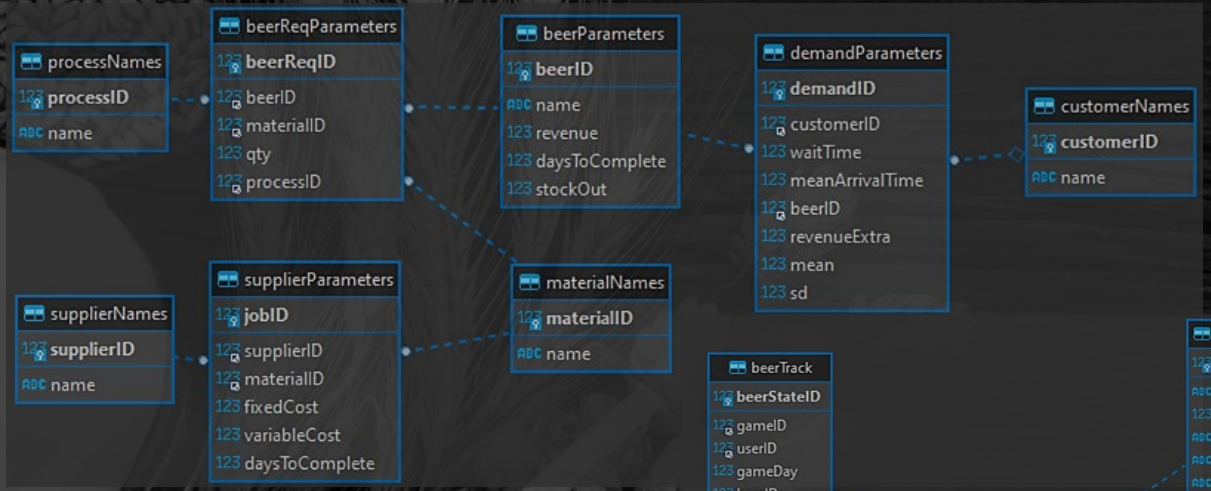


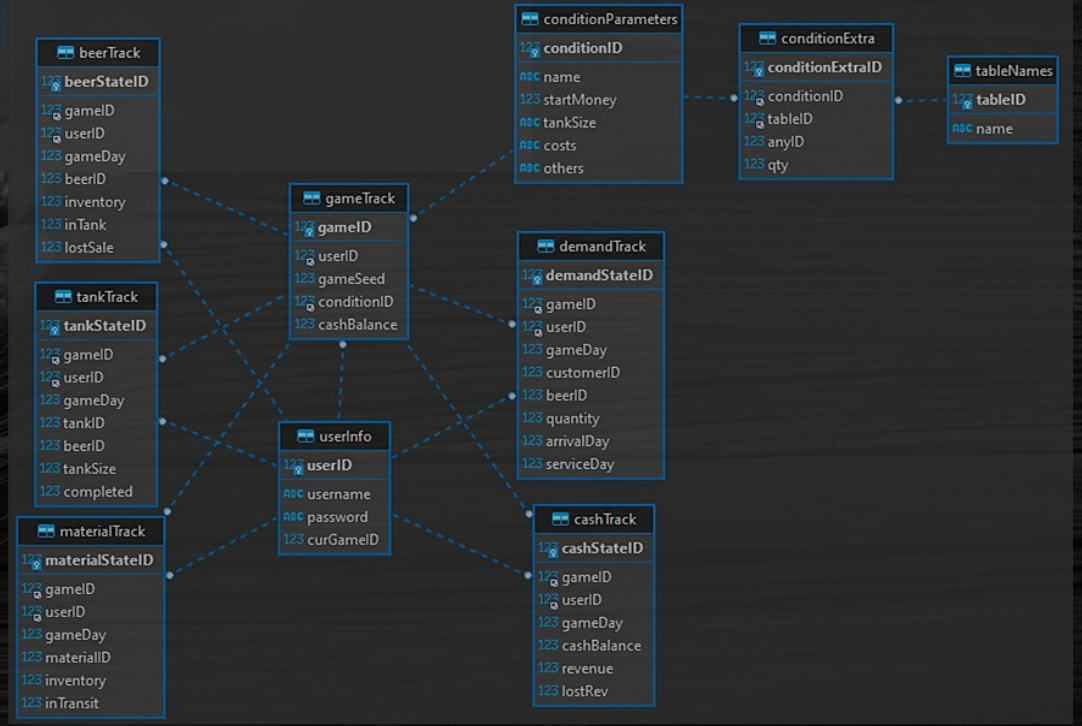


Module and Modules...



Database Design





Possibilities of Improvement

- Have different game difficulties
- Play/Pause game, time-based game
- Additional functions to prevent SQL injections: Only protected the password

Conclusion

- What we set out to do may not occur in the end
- Don't be fixated on the initial plan

Thank You