Experiment Visualization Tool

Baskin Engineering

ArsenalBio

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Abstract

Our team developed an interactive tool to support scientists in **planning, visualizing, and managing biological experiments**. This tool is designed to replace time consuming and error prone manual visualization methods using Google Sheets or Lucidchart.

Approach

Team Management

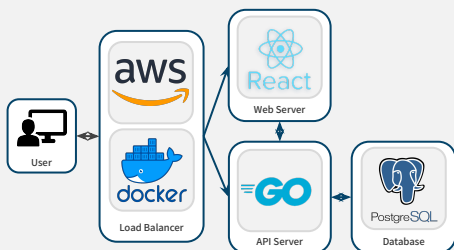Formed 2 sub-teams (Experiment / Plate) to each focus on a portion of the tool

Experiment View

○ View plate nodes in columns for each timestamped process

○ Graph structure displays connections between parent and child plates

○ Option to add a child plate branching off of an existing plate

Plate View

○ Click into a plate to view well grid

○ Color coded by well groups defined by scientists

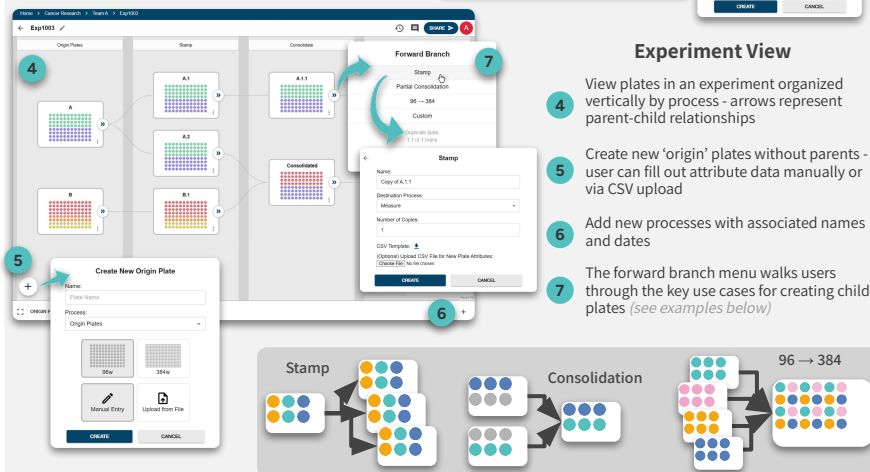○ View and edit well attributes in sidebar or alternate table views

Architecture

User → AWS, React (Web Server), Docker, GO (API Server), Load Balancer, PostgreSQL (Database)

Overview

Dashboard

1 View a list of experiments organized by program and team

2 Users can create a new experiment from scratch or from an existing CSV file

3 Only admins can approve new users

Experiment View

4 View plates in an experiment organized vertically by process - arrows represent parent-child relationships

5 Create new 'origin' plates without parents - user can fill out attribute data manually or via CSV upload

6 Add new processes with associated names and dates

7 The forward branch menu walks users through the key use cases for creating child plates *(see examples below)*

Stamp   Consolidation   96 → 384

Plate View

8 Visualize a plate with color coded well groups and selectable wells

9 Plate settings menu allows the user to manage well groups and custom attributes

10 View and edit the attributes of selected wells

11 Alternatively, view plate data in a table format

12 Track edits in an audit log
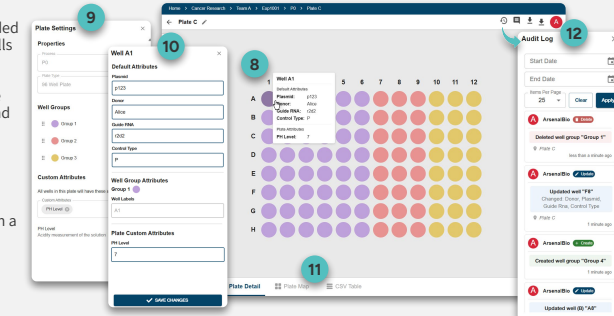
Results

Plate Visualization
Interface to visualize 96/384-well plates of test tubes

Condition Tracking
Track attributes and properties of wells

Lineage Tracking
Visualize plate relationships through different processes

Automation
Automate repetitive tasks to reduce manual entry errors and save time

Data Import / Export
CSV and PDF

Management & Collaboration
Organize by programs and teams, sharing features, and an audit log

Conclusion

Our experiment visualization platform empowers cancer researchers by providing a **graphical interface** to **visualize and manage** their experimental workflows. It **streamlines experiment management** and transforms complex processes into an **organized, intuitive system**. Looking ahead, there is still potential for more features, and our goal is to hand off this platform to **ArsenalBio** to continue development to meet their research needs.

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