CABUNICRISIS

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Objective

Purpose:

Investigate an unknown outbreak pathogen using raw genome sequence data from the Centers for Disease Control and Prevention (CDC) foodborne illness surveillance outbreak investigations

Goal:

Create a Predictive Web Server that automates the process of identifying and characterizing the pathogenic organism and make recommendations for the outbreak control.

Background

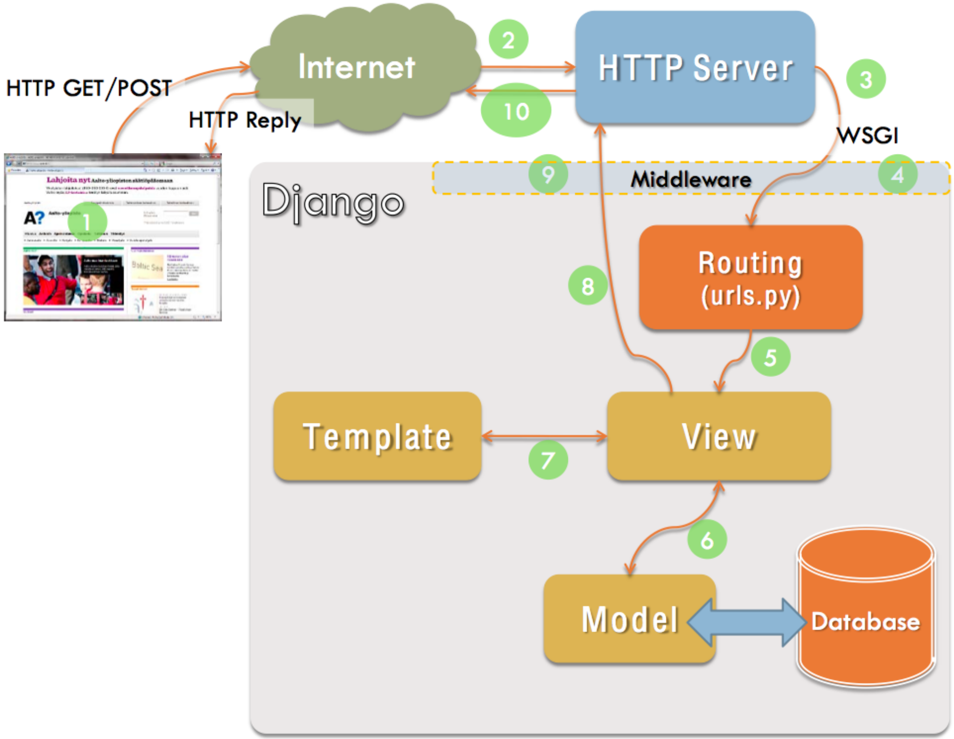
Objectives:

- Assemble the input reads
- Analyze the assembly and predict annotated genes
- Identifying the strain as a phylogenetic tree(or heatmap)
- Calculate distance from the strain in the existing database
- Virulence factor and antimicrobial resistance profiling
- Visualize results in an effective manner

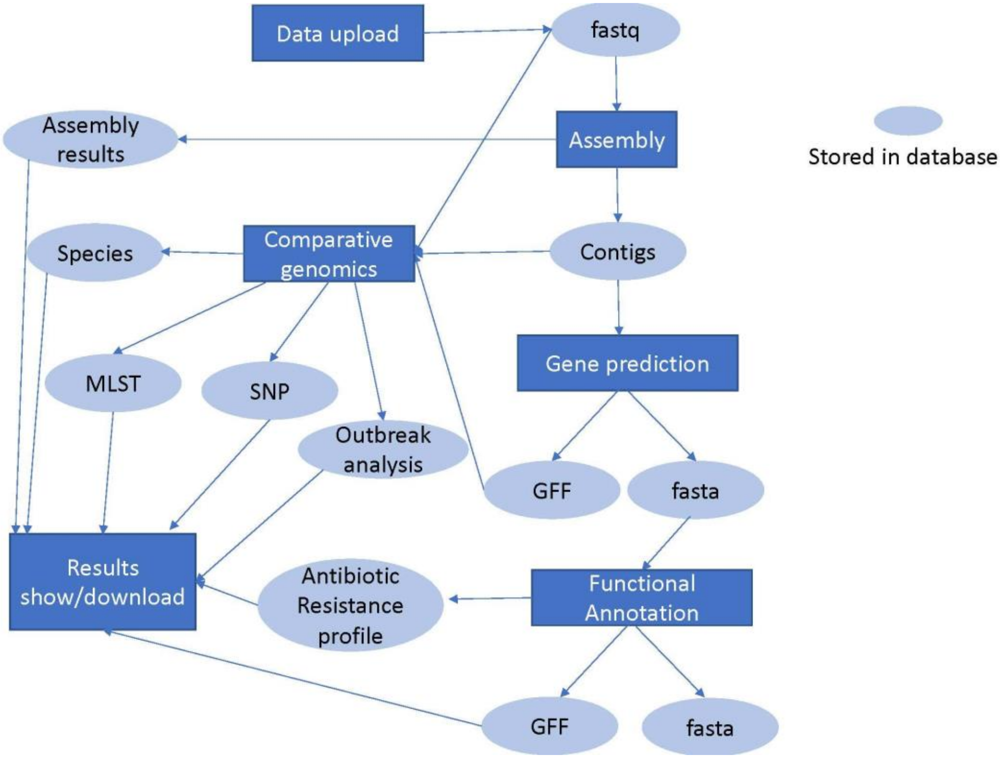
Design Goals

- Mobile friendly
- Easy to use
- Minimal

Basic Website Design

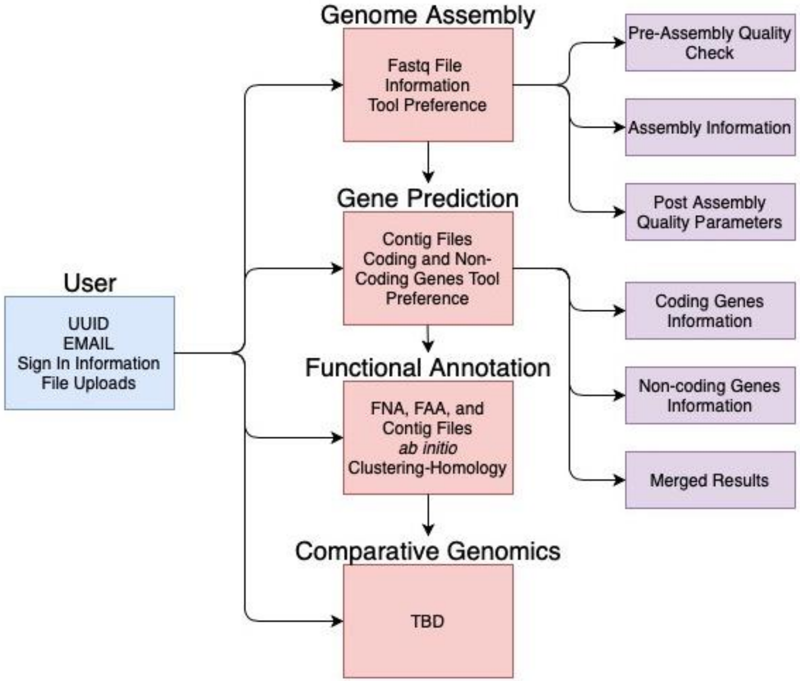


Workflow & function



Database Layer

- We’re using Sqlite for our database, for its lightweight structure, and doesn’t need a heavy server (as in MySQL).
- We’ve created data tables, specific to the group functionalities of our team.
- Our tables are connected through Foreign Key and Many to Many relationships.



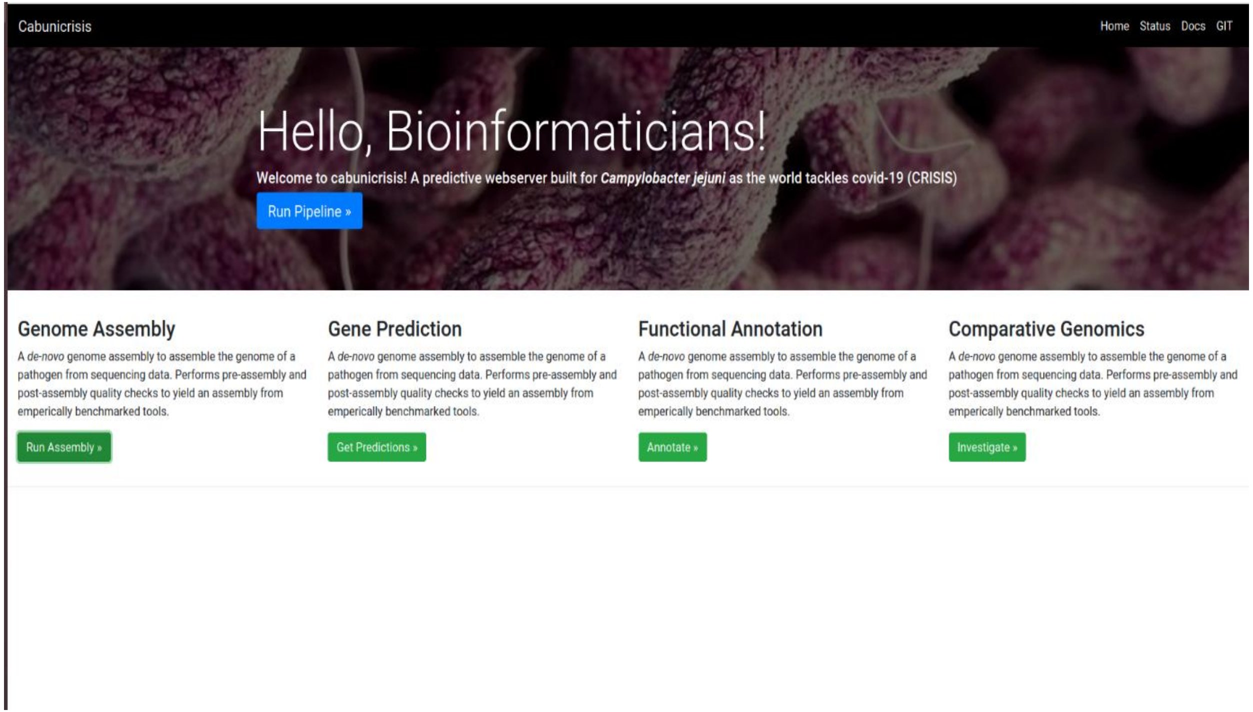
Async Structure for Long Processes

- As we know Bioinformatics tools and tasks can easily take anywhere from minutes to hours to execute successfully.
- But waiting times as long as hours for an HTTP request spoils user experience (default timeouts ~ 200s).
- We therefore chose to use Celery, which is an async task/job queue ideal for running long jobs in the background and update the user once the job is done.
- Celery can be integrated with Django and efficient error-handling can be performed as well.
- Email: We plan on sending email alerts to users once their job is finished.

Email

- SMTP Protocol:
  - Simple Mail Transfer Protocol
  - Python provides a mail sending interface via the smtplib module
  - Django provides a couple of light wrappers over it.
  - These wrappers are provided to make sending email extra quick.
  - Also used to provide support for platforms that can't use SMTP
- Send Grid:
  - **SendGrid** provides a cloud-based service
  - The service manages various types of **email** including shipping notifications, friend requests, sign-up confirmations, and **email** newsletters.
  - We will be using it to send out emails to users once their process is completed.

Screenshot



Hello, Bioinformaticians!

Welcome to cabunicrisis! A predictive webserver built for ***Campylobacter jejuni*** as the world tackles covid-19 (CRISIS)

Genome Assembly

A *de-novo* genome assembly to assemble the genome of a pathogen from sequencing data. Performs pre-assembly and post-assembly quality checks to yield an assembly from emperically benchmarked tools.

Gene Prediction

A *de-novo* genome assembly to assemble the genome of a pathogen from sequencing data. Performs pre-assembly and post-assembly quality checks to yield an assembly from emperically benchmarked tools.

Functional Annotation

A *de-novo* genome assembly to assemble the genome of a pathogen from sequencing data. Performs pre-assembly and post-assembly quality checks to yield an assembly from emperically benchmarked tools.

Comparative Genomics

A *de-novo* genome assembly to assemble the genome of a pathogen from sequencing data. Performs pre-assembly and post-assembly quality checks to yield an assembly from emperically benchmarked tools.

Live Demo