Preliminary Design Presentation

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Client and project description

- Volvo Construction Equipment
- CoPilot app

Changes since previous presentation

- We changed how paths in G-Code is presented and edited.
  - We felt that just displaying the G-Code as raw code felt unwieldy on a smaller screen.
  - We didn't just want to implement the editing of the G-Code as a text editor.

- The number of available activities autonomous machines can perform at a point has increased since the previous implementation.
  - Start
  - Finish
  - Wait

The high-level design

Our project consists of three major components

- The app itself, which serves as an interface for the user.
- The database (Firebase), that makes data shareable between multiple users.
- The GPS-localization system (Google Maps API) and map view.

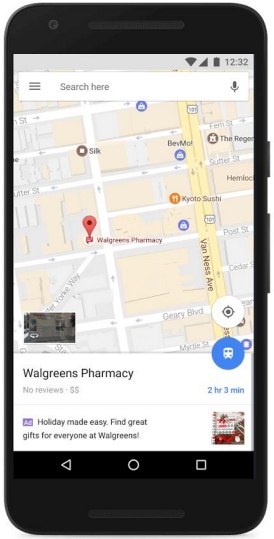
Implemented features so far

- Users can login to the app
- Users can view a list of the existing paths
- Users can delete existing paths
- User can edit path name and description
- Users can navigate between different views in the app
- Google Maps API is used for displaying the path
- Firebase cloud database integrated into the app

External systems

We rely on Google Maps API to:

- Show a stylized satellite view of the map
- Display the users position on the map



External systems

- Cloud-based platform for mobile and web development
- Authentication
- Realtime database

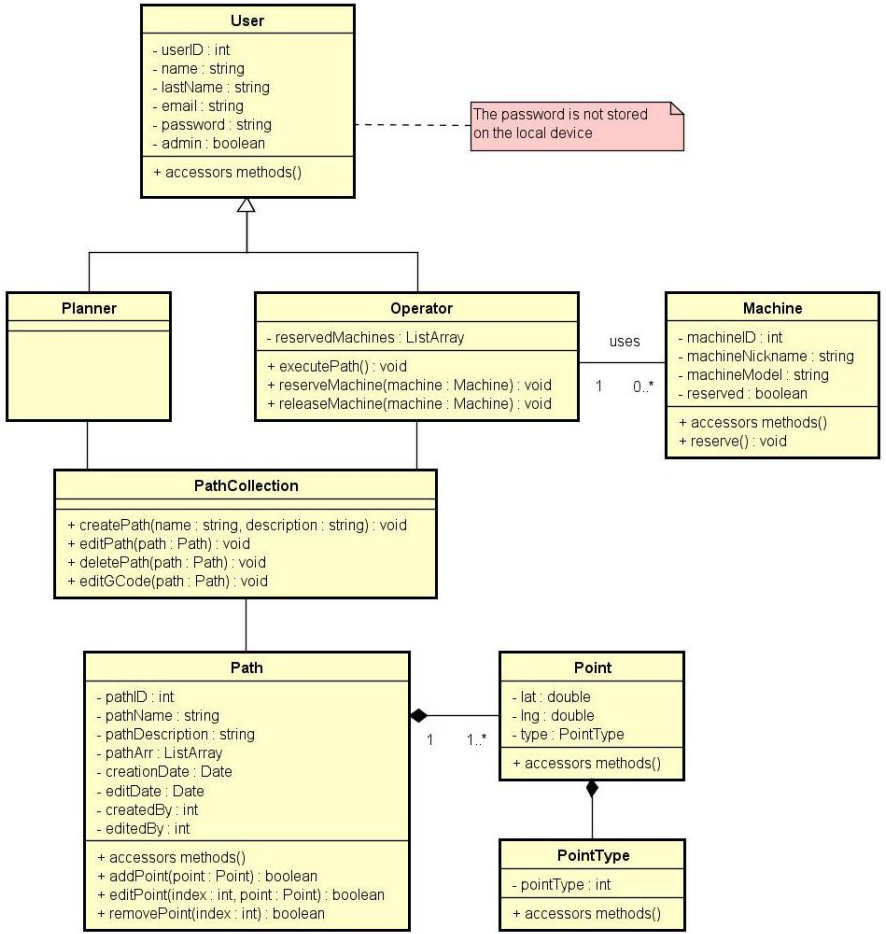
Important design decisions

- Selecting Firebase as database.
  - No specific database setup is needed.
  - SDK available for Android.
  - Cloud-hosted
  - Real-time
  - Well documented

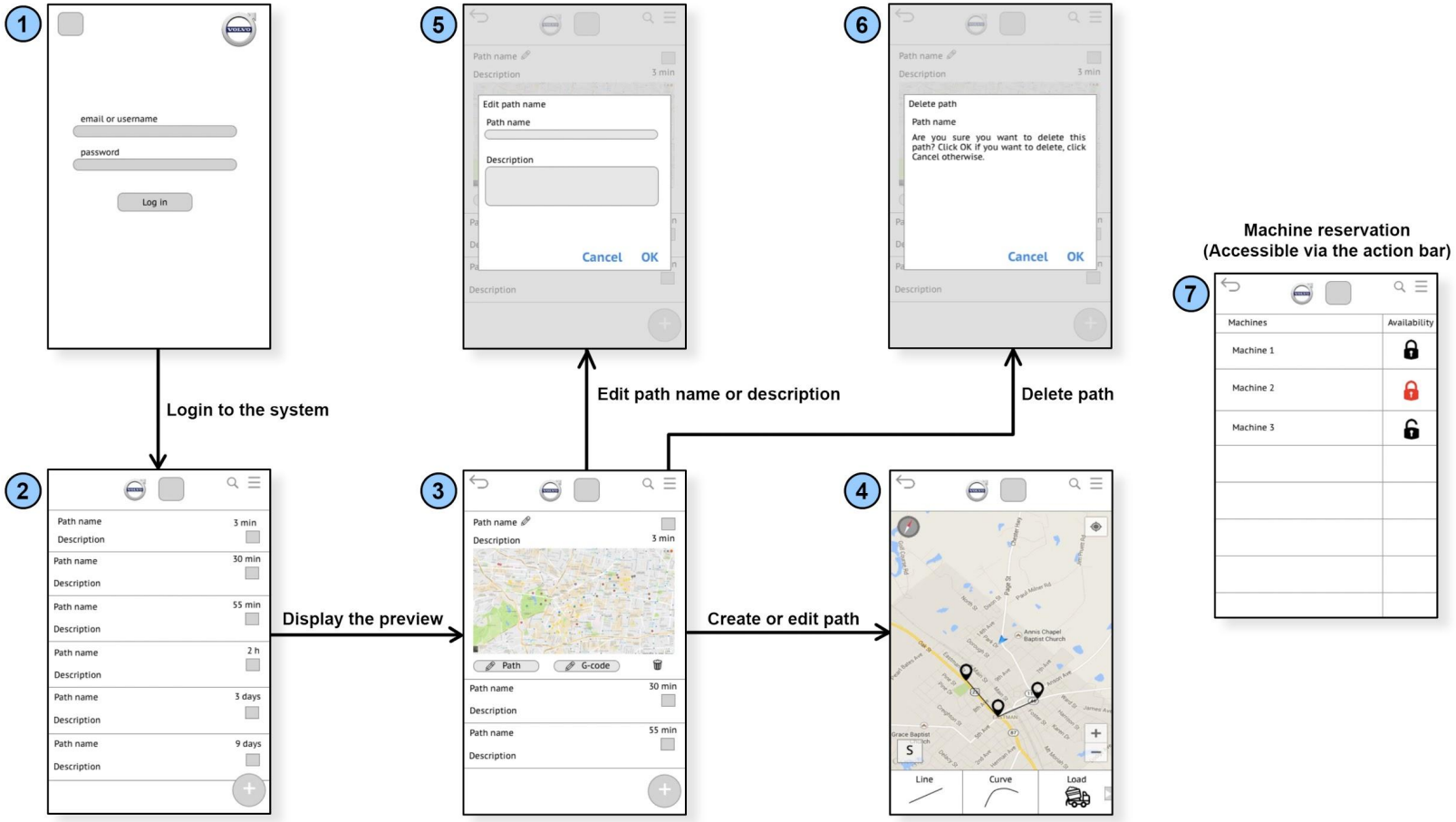
- Using Google Maps SDK
  - Has mapping data all across the world
  - SDK is available for Android that allows customization of the map
  - Offers an API

Interesting parts of the detailed design

- **User**: contains the attributes and methods related to user information.
- **Planner**: represent users that only can create and edit paths.
- **Operator**: represents user that also can reserve machines and tell machines to follow a path
- **Machine**: represents the reservable machines
- **PathCollection**: handles the creation, editing and deletion of paths
- **Path**: represents a route automated machines can be told to follow
- **Point**: represents a points in a coordinate system
- **PointType**: is the activities the automated vehicles can perform.



The GUI structure



Client feedback

- The client wants the G-Code to be presented in a innovative way.
- We can consider the earth being flat when creating paths.
  (and change this later if there is enough time)
- Machines should be able to have “nicknames” instead of just unique identification.
- We should not worry about using their systems to login.
  (they will adapt the app to their system, if they proceed with it)
- Only administrators should be able to remove paths from the database

Plans for the rest of the implementation phase

The second implementation phase (this week)

1. Users should be able to create or edit paths.
2. Users should be able to view paths in the G-Code format.
3. User should be able search for paths using the paths name, in the listview

The third implementation phase

1. Make sure all features in the app work as intended.
2. Ensure that the code quality is high enough for Volvo CE to continue development of the app if they are interested in the concept.
3. If there's time left we want to take inclination between points into account.

Thank you for your attention!

Any questions?