ENGG4811: Thesis Project

Project Progress Seminar

Date: 10/05/2021

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Co-supervisor: Dr Regis Riveret (CSIRO)

Content Overview

- Background
- Progress
- Demonstration
- Plan

Thesis Topic

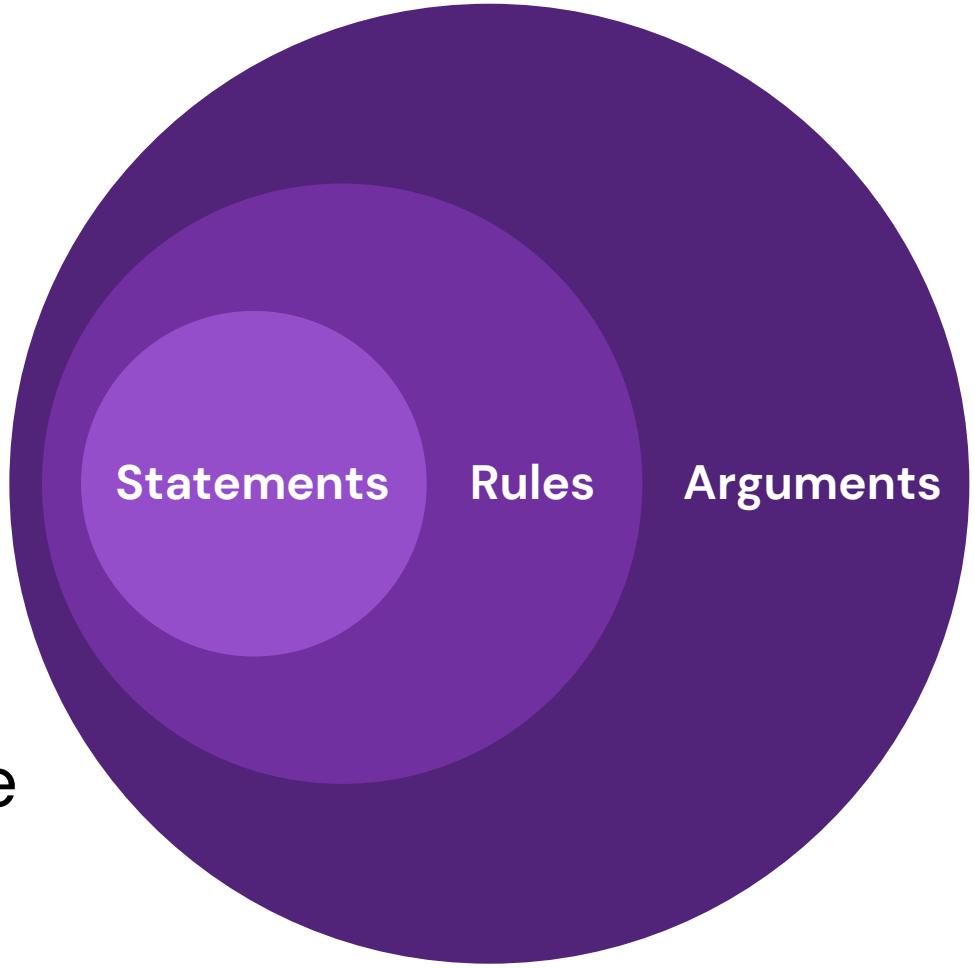
Designing and implementing a user-friendly web interface for interacting with a remote rule engine in regulatory technologies

Rule engine?
Regulatory technologies?

Background

Rule engine

- This project: Prolog rule-based argumentation engine
- Rules, relations and messages are used to draw a conclusion [2]
- Labels statements with acceptance status



Regulatory technologies (RegTech)

- Application of IT to manage regulation objectives [3]
- Example: law compliance

Project Relevance

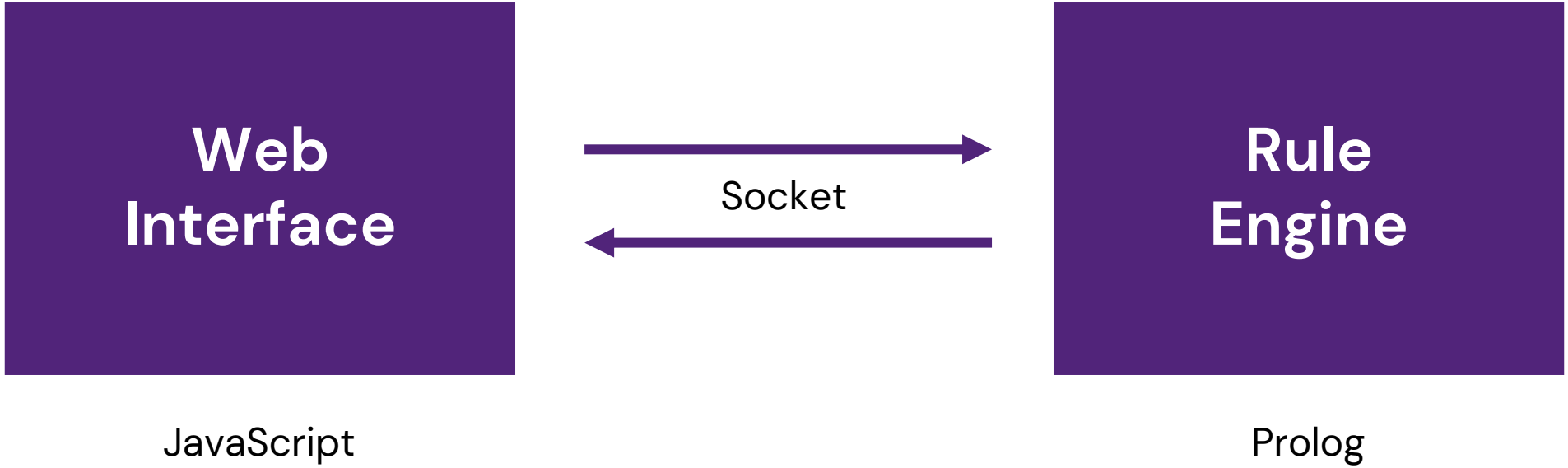
Current interaction with rule engine

- Edit Python file with rules and messages
- View HTML file with statement labellings

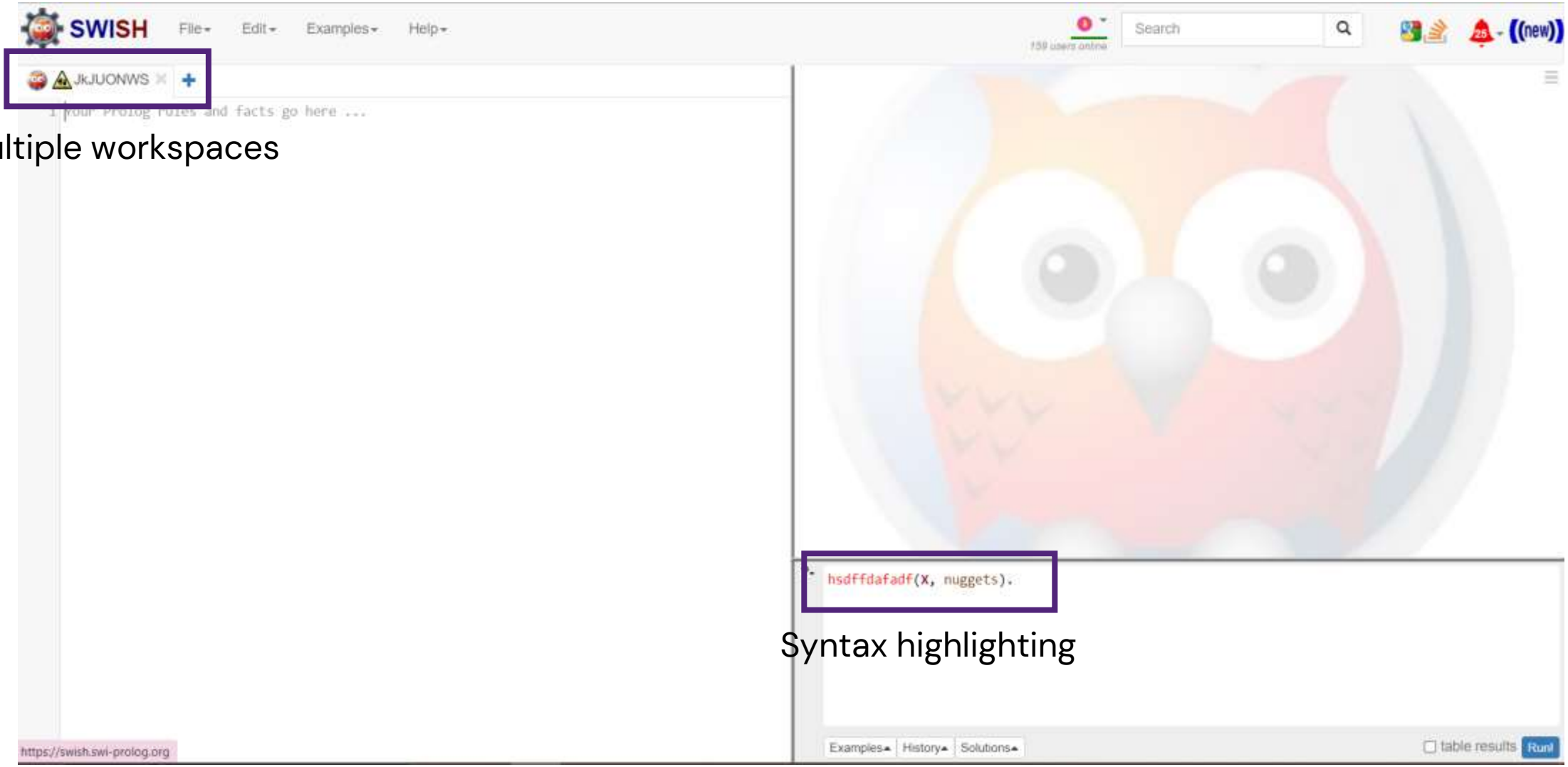
Problems

- Very primitive client (written in a few hours)
- Rules/messages written in JSON format within Python file

Initial Concept



Related Work

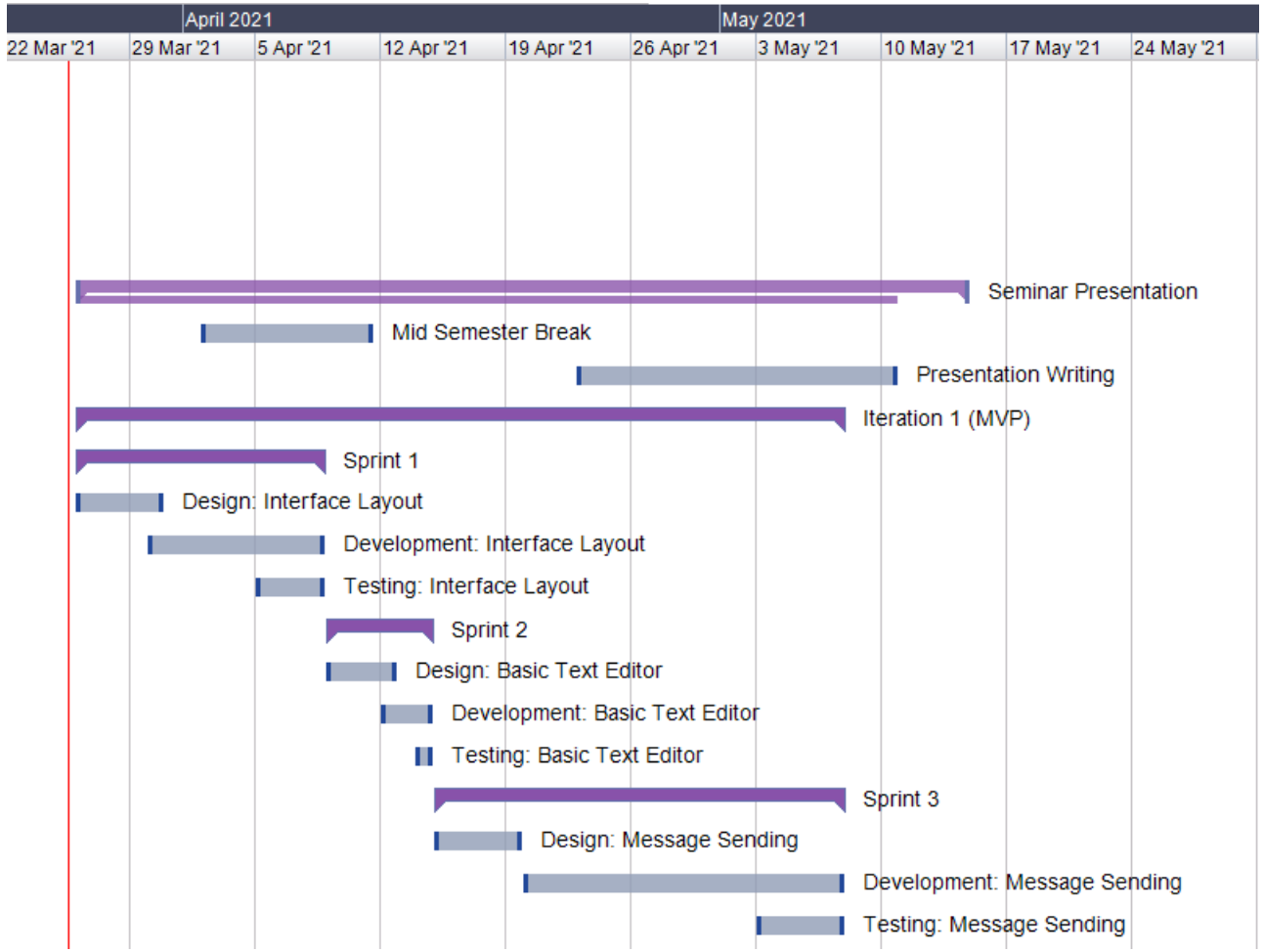


Multiple workspaces

Syntax highlighting

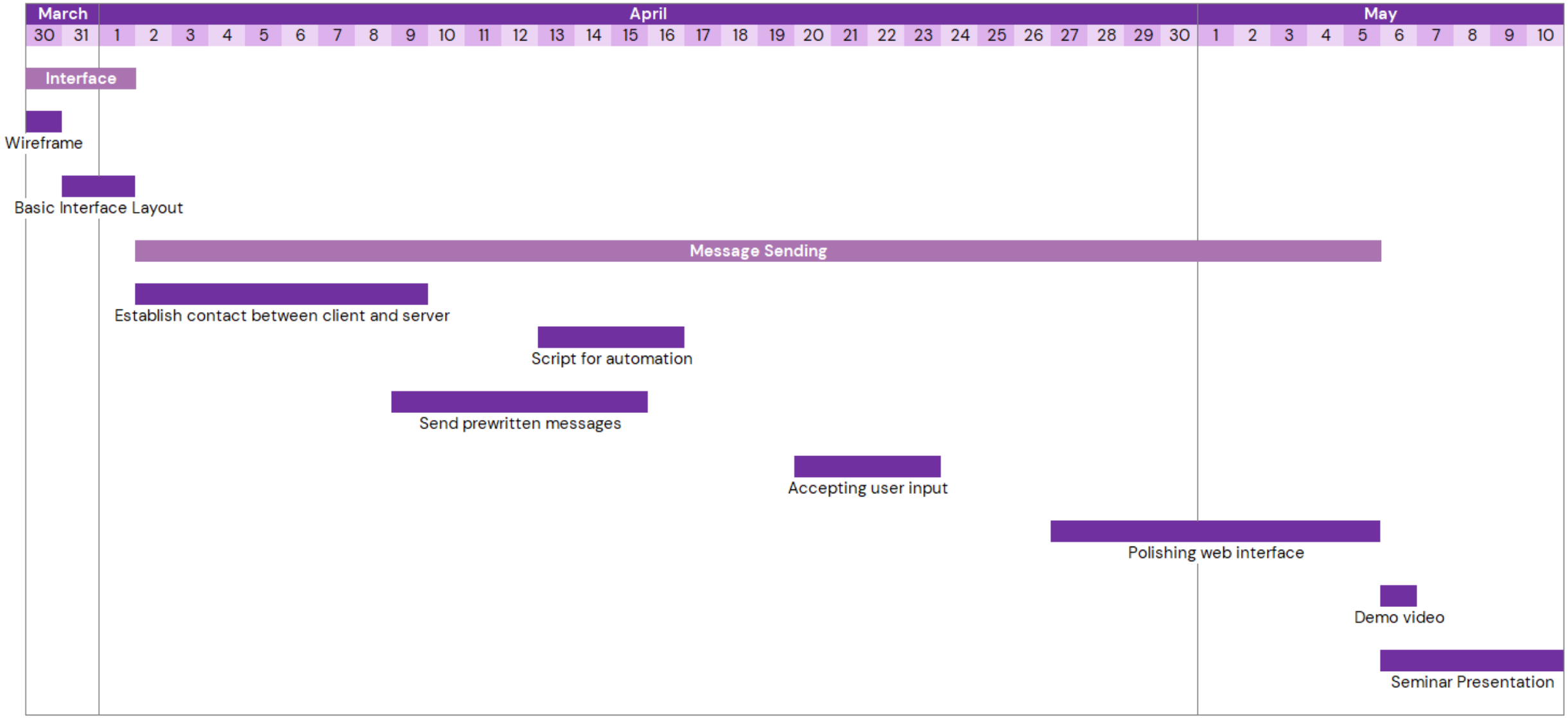
[4]

Initial Timeline



Key Tasks

- Interface Layout
- Text Editor
- Message Sending


March
April
May
30 31 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 1 2 3 4 5 6 7 8 9 10
Interface
Wireframe
Basic Interface Layout
Message Sending
Establish contact between client and server
Script for automation
Send prewritten messages
Accepting user input
Polishing web interface
Demo video
Seminar Presentation

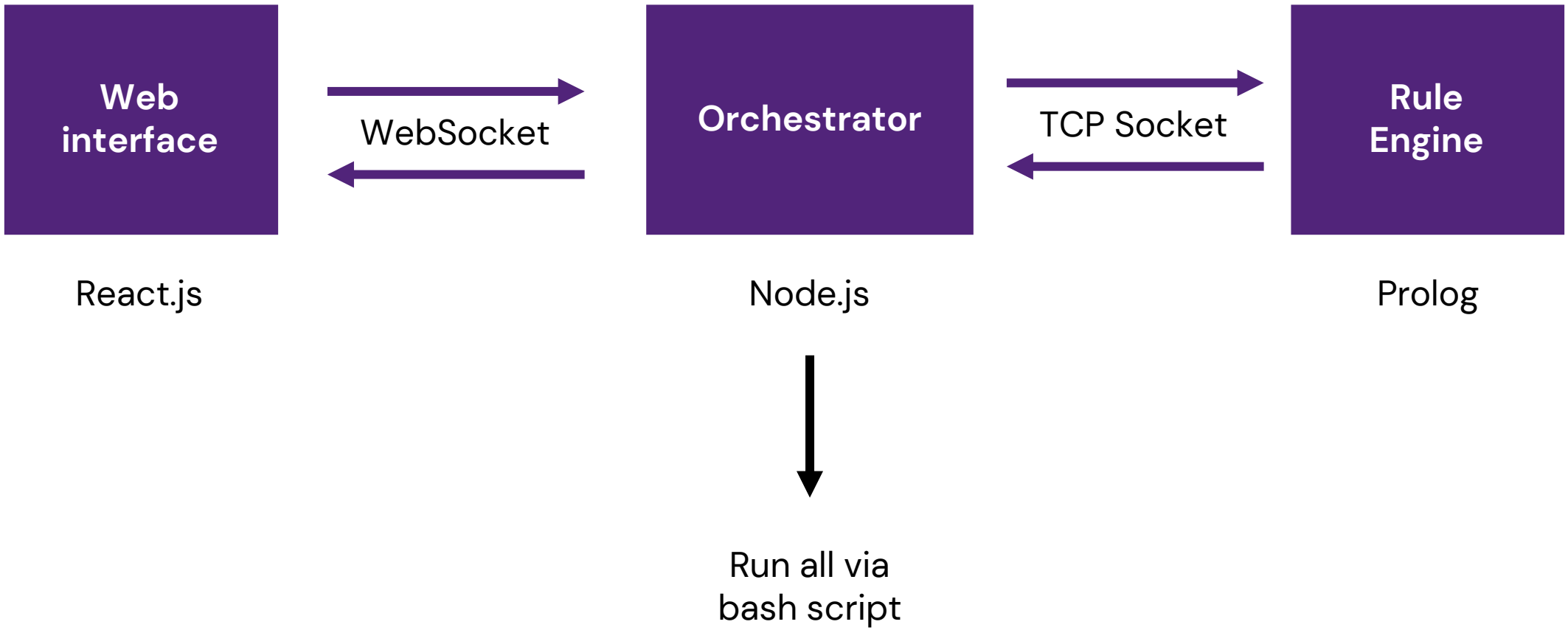
Basic Interface Layout

Enter your rules or messages here...

Run

Results

Establish contact between client and server



Send prewritten messages

Enter your rules or messages here...

Run

```
[[],ooo,[],ooo,[]] . [[],ooo,[],ooo,[]] . [[],ooo,[],ooo,[]] .
[[],ooo,[],ooo,[]] . [[],ooo,[],ooo,[]] . [[],ooo,[],ooo,[]] .
[[[window(node1)],[location(node1,
[28.0166,153.0251,0])]],ooo,[],ooo,[]] .
[[[no,distancing(node2,node1,10)],
[obl,distancing(node2,node1,10)],[wall(node2)],
[location(node2,[28.0166,153.0251,0])],
[violation(node2,node1,10)]],ooo,[],ooo,[]] .
[[[goodWall(node2)]],ooo,
[[obl,distancing(node2,node1,10)],
[violation(node2,node1,10)]],ooo,[]] .
```

Results

Accepting user input

Rules

id {name of rule} if {body} then {head}.

id {name of rule} then {head}.

Relations between rules

superior ({rule id 1}, {rule id 2}).

Information Messages

message ([{info}={information content}, ...]).

Polishing web interface

```
id obligation if wall(Node1) and window(Node2) then obl distancing(Node1, Node2, 10).

id distance if wall(Node1) and window(Node2) and location(Node1, [X1, Y1, Z1]) and location(Node2, [X2,
Y2, Z2]) and distance_2D_Less([X1, Y1], [X2, Y2], 10) then no distancing(Node1, Node2, 10).

id violation if obl distancing(Node1, Node2, 10) and no distancing(Node1, Node2, 10) then
violation(Node1, Node2, 10).

id noObligation if goodWall(Node1) and window(Node2) then no obl distancing(Node1, Node2, 10).

superior(noObligation, obligation).

message( ["nodeID"='node1', "messageID"='message1', "fact"='[window(node1)]',
"location"='[location(node1, [280166, 1530251, 0])]'] ).

message( ["nodeID"='node2', "messageID"='message1', "fact"='[wall(node2)]', "location"='[location(node2,
[280166, 1530251, 0])]'] ).

message( ["nodeID"='node2', "messageID"='message1', "fact"='[goodWall(node2)]',
"location"='[location(node2, [280166, 1530251, 0])]'] ).
```

Run

UNDECIDED STATEMENTS:

---------- Next Message ----------

ACCEPTED STATEMENTS:

[[window(node1)],[location(node1, [280166,1530251,0])]]

UNACCEPTED STATEMENTS:

UNDECIDED STATEMENTS:

---------- Next Message ----------

ACCEPTED STATEMENTS:

[[no,distancing(node2,node1,10)], [obl,distancing(node2,node1,10)],[wall(node2)], [location(node2,[280166,1530251,0])], [violation(node2,node1,10)]]

UNACCEPTED STATEMENTS:

UNDECIDED STATEMENTS:

---------- Next Message ----------

ACCEPTED STATEMENTS:

[[goodWall(node2)]]

UNACCEPTED STATEMENTS:

[[obl,distancing(node2,node1,10)], [violation(node2,node1,10)]]

UNDECIDED STATEMENTS:

---------- Next Message ----------

Polishing web interface

Home | Run

```
id obligation if wall(Node1) and window(Node2) then obl distancing(Node1, Node2, 10).

id distance if wall(Node1) and window(Node2) and location(Node1, [X1, Y1, Z1]) and
location(Node2, [X2, Y2, Z2]) and distance_2D_Less([X1, Y1], [X2, Y2], 10) then no
distancing(Node1, Node2, 10).

id violation if obl distancing(Node1, Node2, 10) and no distancing(Node1, Node2, 10) then
violation(Node1, Node2, 10).

id noObligation if goodWall(Node1) and window(Node2) then no obl distancing(Node1, Node2,
10).

superior(noObligation, obligation).

message( ["nodeID"="node1", "messageID"="message1", "fact"="[window(node1)]", "location"="
[location(node1, [280166, 1530251, 0])]"] ).

message( ["nodeID"="node2", "messageID"="message1", "fact"="[wall(node2)]", "location"="
[location(node2, [280166, 1530251, 0])]"] ).

message( ["nodeID"="node2", "messageID"="message1", "fact"="[goodWall(node2)]", "location"="
[location(node2, [280166, 1530251, 0])]"] ).
```

[window(node1)],[location(node1,[280166,1530251,0])]

REJECTED STATEMENTS:

UNDECIDED STATEMENTS:

{"nodeID":"node2", "messageID":"message1", "fact":"[wall(node2)]", "location":"[location(node2, [280166, 1530251, 0])]"}.

ACCEPTED STATEMENTS:

[no,distancing(node2,node1,10)],
[obl,distancing(node2,node1,10)],[wall(node2)],
[location(node2,[280166,1530251,0])],
[violation(node2,node1,10)]

REJECTED STATEMENTS:

UNDECIDED STATEMENTS:

{"nodeID":"node2", "messageID":"message1", "fact":"[goodWall(node2)]", "location":"[location(node2, [280166, 1530251, 0])]"}.

ACCEPTED STATEMENTS:

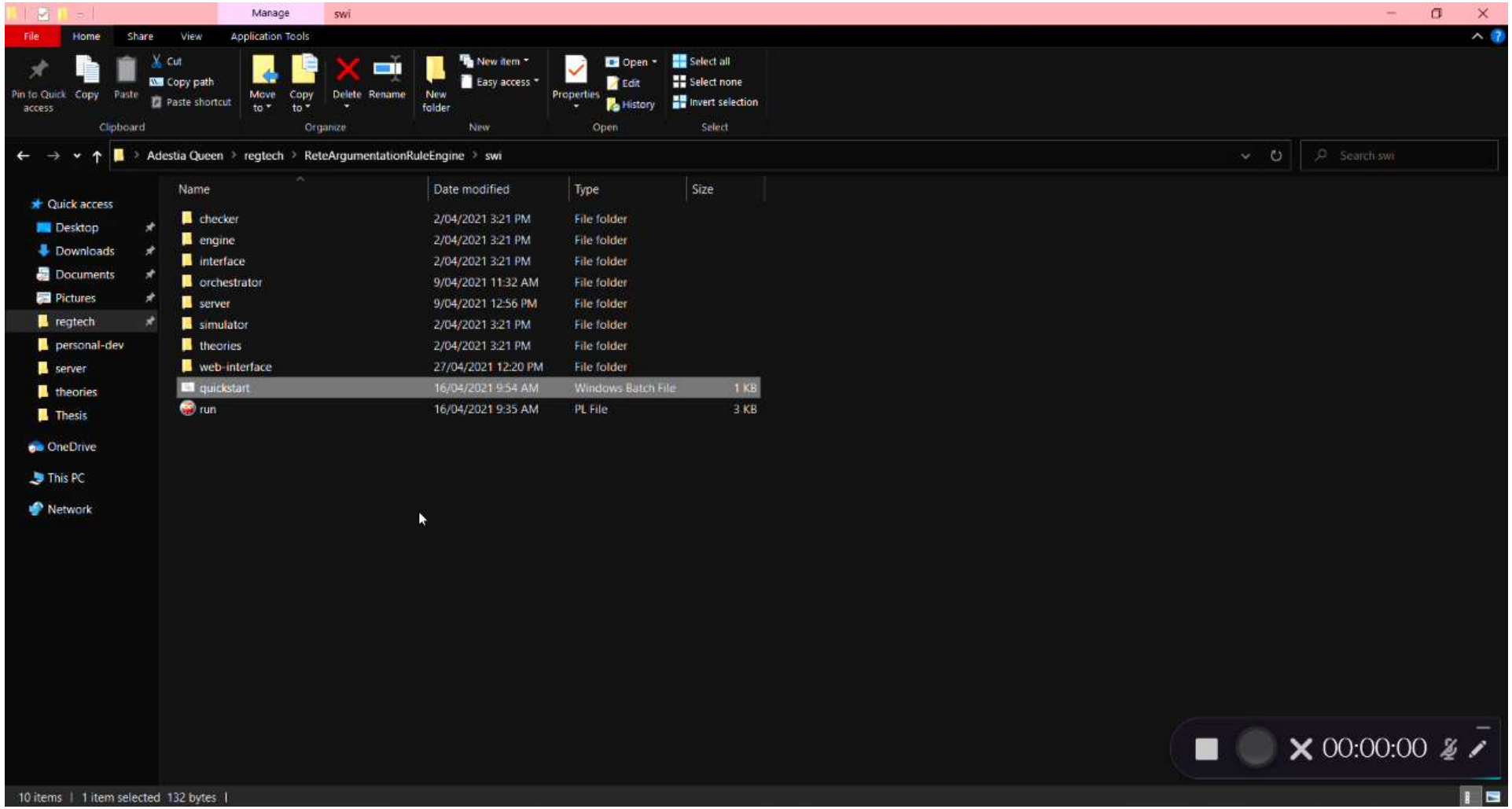
[goodWall(node2)]

REJECTED STATEMENTS:

[obl,distancing(node2,node1,10)],
[violation(node2,node1,10)]

UNDECIDED STATEMENTS:

Project Demonstration



Plan

Orchestrator

- Forward messages from sensors to rule engine
- Error handling

Web interface

- Text editor
  - Accepting different syntax for rules/messages
  - Syntax highlighting
  - Upload and save theories
- Results
  - Clear results with each run

References

[1] Queenslandari, A. (2021). *ENGG4811 Thesis Proposal* [Unpublished Manuscript], ENGG4811: Thesis Project, The University of Queensland.

[2] Riveret, R., Oren, N., & Sartor, G. (2020). A probabilistic deontic argumentation framework. *International Journal of Approximate Reasoning, 126*, 249. https://doi.org/10.1016/j.ijar.2020.08.012.

[3] Ascent. (2018–2021). *What is RegTech?* https://www.ascentregtech.com/what-is-regtech/.

[4] SWISH-Prolog. (2021). *SWISH*. https://swish.swi-prolog.org/.