CS Capstone Requirements Document

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Project ROUS

Prepared for

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Abstract

This document will give an overview of software dependencies, the intended function, characteristics, constraints, and assumptions of the framework. The first section is geared more towards giving a high level examination of the framework. The third and fourth sections, Specific Requirements and Software System Attributes, are intended for a more technical audience who would be familiar with the technical aspects and relevant terminology of this framework.

CONTENTS

1 Introduction

1.1 Purpose

The purpose of this document is to layout and define the objective and details of the framework to be developed. This document will specify an overall description, specific requirements, and software system attributes of this framework. This document details what the project's end product will do for an end user. The intended audience for this document includes any relevant stakeholders.

1.2 Scope

This main goal will be to allow a user to input an objective into the framework, see how the framework organizes on that objective, and then view the result of that organization.

1.3 Definitions, Acronyms, Abbreviations

Term	Definition
Stakeholder	User of the Project ROUS
Project ROUS	framework that includes all aspects of input, output, software, hardware, and user interface
User	The person who would use this at its completion that doesnt know how it works
Node	Our built device that acts as a layer between IoT enabled machines and other nodes
Docker	A container of isolated code
Unix	An open-source operating system
Rodents of Unusual Size (ROUS)	Project name
Graphical User Interface (GUI)	A visual representation for the user to interact with
Internet of Things (IoT)	A blanket statement to describe objects that have been made to be able to connect to the Internet.
Model View Controller (MVC)	A software architecture for implementing an interface for the user
Local Area Network (LAN)	A network of connected devices contained within a small geographical space
Message Queue Telemetry Transport (MQTT)	lightweight TCP/IP protocol
Advanced RISC Machine (ARM) architecture	computer processor architecture

1.4 References

IEEE. IEEE Std 830-1998 IEEE Recommended Practice for Software Requirements Specifications. IEEE Computer Society,1998.

1.5 Overview

The next section of this document, Overall Description, gives a high level view of the framework. The third and fourth sections, Specific Requirements and Software System Attributes, will give a slightly more in-depth examination of the different aspects of the framework.

2 Overall Description

2.1 Product Perspective

The framework will be a middle layer between the user and the result. Users will input a structured objective into the framework, the framework will organize on that objective, and then the user will see the result.

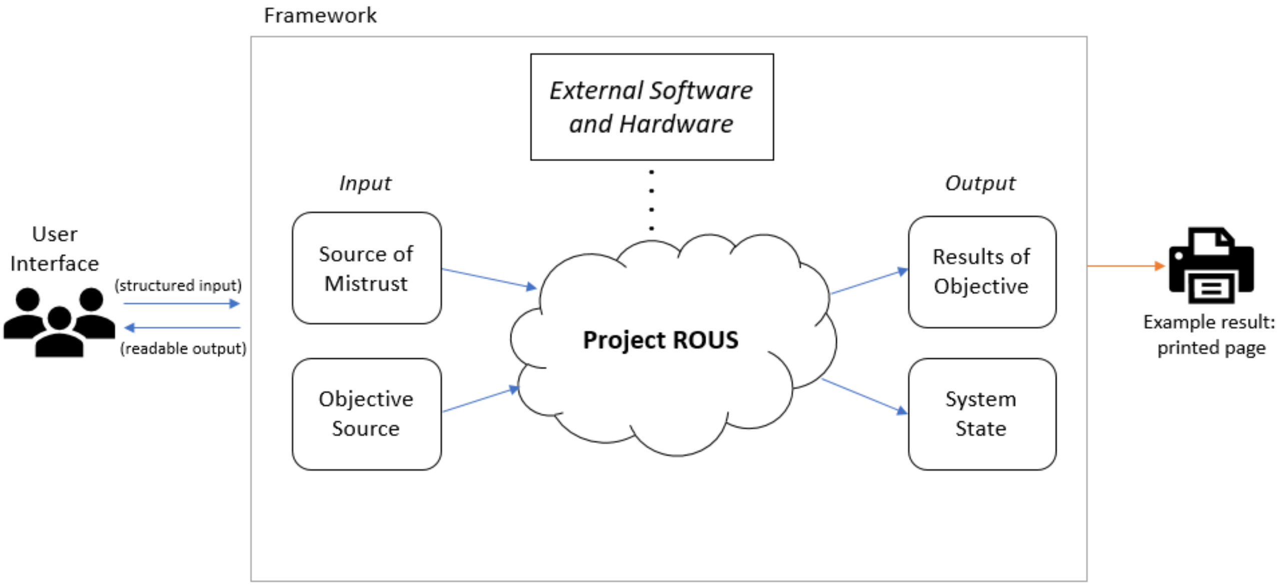


Fig. 1. This figure shows a context view of the overall framework. It describes the sources of input and output to the system.

2.1.1 System Interfaces

The primary system interface will be a Unix based operating system. This framework will interact with the Unix operating system in order to utilize its services.

2.1.2 User Interfaces

- A command line based interface to modify framework settings.
- A GUI that will allow users to input objectives and view the results. Outputted results will have clear visualization that is readable and understandable to relevant stakeholders.

2.1.3 Hardware Interfaces

This framework will use a combination of various ARM based micro-controllers. These micro-controllers must have the functionality to communicate with 802.11 b/g/n wireless LAN communication protocols.

2.1.4 Software Interfaces

Framework will be built in software. It will only interact with the Unix based operating system. Users will interact with the framework through a software user interface.

2.1.5 Communications Interfaces

The network protocol that is required by this framework is Ethernet, with communication protocols TCP/IP and 802.11 b/g/n wireless LAN.

2.1.6 Memory constraints

The framework is only constrained to what the hardware that is used will allow.

2.1.7 Operations

There will be two modes of operation within the user organization.

- Background Operation Mode
- User Mode

The main mode of operation is the background operation mode, this mode will operate exclusively in the background. Next is the user mode which will be input and output operations. This mode will allow users to input structured objectives, to the view the result of those objectives, and to output the systems state.

2.1.8 Site Adaptation Requirements

There are no site adaptations required.

2.2 Product Functions

Below is a list of the basic functions that this framework will perform. It is a high level view of the functions that the framework will be able to execute.

- Send an objective to the framework
- Display the results of the objective
- Send a source of mistrust to the framework
- Display the system state
- User interface that visualizes the results of an objective
- Framework can self-organize on an objective

In the figure below you will see a basic high level description of how this framework will function.

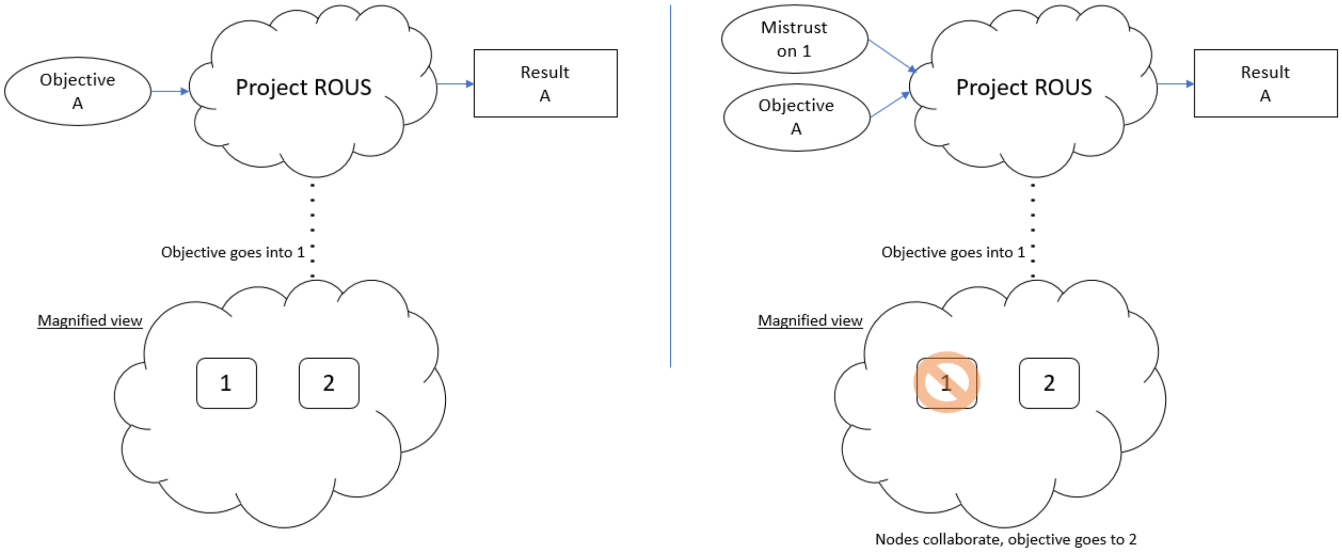


Fig. 2. The right image shows an objective A being inputed into the framework, and its corresponding result A. In the left image, it shows the same objective A going to the same node 1, but this time the node 1 is mistrusted. Now have to self organize and reroute the objective to a different node 2 which achieves the same result A.

2.3 User Characteristics

The users of this framework will be our relevant stakeholders. These users will have had some level of formal technical education.

2.4 Constraints

This framework will not communicate to outside sources for any of its configuration settings. Each individual node must be able to lead the framework on decisions required. Nodes cannot utilize an external database for its inner information structure. Nodes cannot exchange information by using an external database.

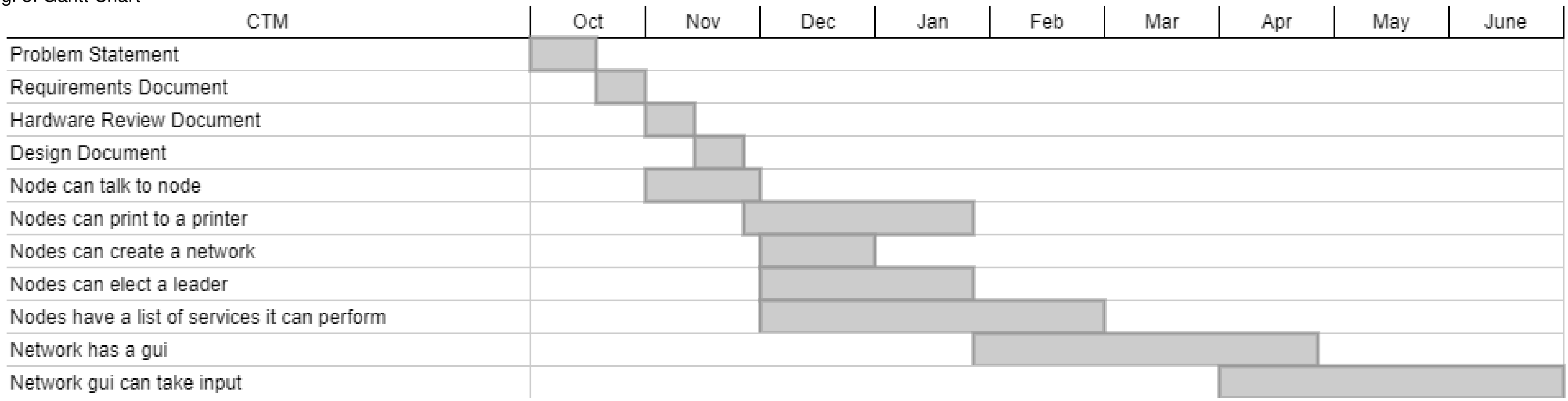
2.5 Assumptions and Dependencies

This document and current requirements assume that each hardware device used has Ethernet capabilities, also large enough memory and storage to fit the frameworks docker image. Physical devices will have the resources available to run the docker image. These physical devices will also be able to handle the frameworks user interface.

2.6 Apportioning of Requirements

Refer to Gantt chart in figure below for this information.

Fig. 3. Gantt Chart



3 Specific Requirements

3.1 External Interfaces

- Input:
  - Objective
  - Source of Mistrust
- Output:
  - Result of Objective
  - System state

3.2 Functions

The system shall ...

- Enable nodes to self organize on an inputed objective
- Allow an objective to be inputed
- Allow a source of mistrust to be inputed
- Output readable configuration data
- Output readable system state data
- Output readable results of objective
- Automatically validate and connect to authorized nodes
- Allow nodes to share objectives with each other
- Framework state changes based on the input of a source of mistrust
- Have a user interface
- Offer a print service

3.3 Performance Requirements

This framework will support at a minimum two nodes. Each objective received by the framework from the user will start and execute on 90% of the services required by the objective given. Only one user will be able to input an objective at a time. Objectives can be queued and executed consecutively. Each node will support, at a minimum, a print service. A user will have to wait for an objective to complete before inputing a new objective.

3.4 Logical Database Requirements

There are no database requirements.

3.5 Design Constraints

There is not an external database to which the framework should be writing to or retrieving from to carry out objectives. The network must be able to send a parallel job to two monochrome printers. The network must be able to send a singular job to a color printer with parallel being a stretch goal.

3.6 Standards Compliance

This framework will need to stay compliant with IEEE WLAN and MQTT standards.

4 Software System Attributes

4.1 Reliability

The reliability of this framework will be measured by the user's ability to:

- input an objective into the framework
- see the objective being organized in the framework
- view the results of that organization

This allows the user to visually watch the (lifespan) of their objective and its effects on the system.

4.2 Security

The framework will only accept authorized nodes. Nodes will be password protected and will only accept objectives and sources of mistrust from verified users.

4.3 Maintainability

Code will be well commented and readable to 8 out of 10 software developers. A MVC design scheme will be implemented. File structure will be well organized and self explanatory to navigate.

4.4 Portability

This framework will be fully portable to any system that can run a Docker container.

4.5 Other Requirements

No additional requirements for this framework.