

## # Elevator Control System and Simulator

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Carleton University  
Department of Systems and Computer Engineering  
SYSC 3303A Real-Time Concurrent Systems Winter 2023  
Iteration 4 – Adding Error Detection & Correction.  
@version 1.0, 02/04/23  
@version 2.0, 02/27/23  
@version 3.0, 03/11/23  
@version 4.0, 03/25/23  
@version 5.0, 04/10/23

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### ## Group 7 Members:

- \* Ismail Zakaria
- \* Liu Patrick
- \* Nguyen Trong
- \* Elmokdad Hussein
- \* Ngo Huu Gia Bao

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The distribution of work was coordinated using Atlassian Jira Software which can be viewed using this link: [ECSS](#) for quick reference – see APPENDIX A. Here below is a general summary:

#### Iteration 5:

- Trong:
  - Implemented GUI for a whole system
  - Fixing timing bug of the Parser
  - Timing diagram, documentation
- Bobby:
  - Improved algorithm for Scheduler
  - UML class diagram, documentation
- Hussein:
  - Improved Floor Subsystem
  - Fixing bugs of the floor subsystem
- Patrick:
  - Updated the Parser functionality by adding new column representing the error
  - Sequence diagram
- Zak:
  - Improved, added unit tests and fixed bug for Elevator subsystem.

#### Iteration 4:

- Trong:
  - Implemented encode & decode interfaces for data transfer objects
  - Implemented floor request dispatching at a relative offset time
- Bobby:
  - Refactored Scheduler subsystem, implemented event-driven state machine
  - Developed optimal elevator job assignment algorithm
  - Unit testing of the elevator, scheduler, & floor subsystems
- Hussein:
  - Implement multiple floors and elevators each running on separate threads
  - Updated messaging interface to use UDP instead of RPC
- Patrick:
  - Refactored Scheduler subsystem, implemented event-driven state machine
  - Developed network communication interfaces for the Scheduler subsystem
  - Validated elevator car shaft traversal algorithm
  - Class Diagrams for subsystems
- Zak:
  - Refactored Elevator subsystem, designed & implemented event-driven state machine
  - Developed elevator car shaft traversal algorithm, added fault states and associated elevator behaviours

### Iteration 3:

- Trong:
  - Implement Remote Procedure Calls using UDP
  - Implement distributed system processes
  - Documentation: Update class UML, sequence UML, Work Distribution Document, README
- Bobby:
  - Improve elevator traversal to each floor sequentially
  - Create UI integration with Static Model of Domain (buttons, sensors...)
- Hussein:
  - Implement multiple floors and elevators each running on separate threads
- Patrick:
  - Improved parser by sorting elevator request prior to sending to Floor
- Zak:
  - Elevator subsystem refactoring & design

#### Iteration 2:

- Trong: SchedulerState class, FloorState class, SchedulerStateTest, FloorStateTest class, and javadocs
- Bobby: FloorState class, README, refactoring, documentation
- Hussein: UI improvements, refactoring
- Patrick: Update Elevator Location feature, UML and State diagrams
- Zak: Proposing ideas, revisions

#### Iteration 1:

- Trong: Elevator class, README, UML class & sequence, refactoring
- Bobby: Scheduler class, README, UI logger
- Hussein: Floor class, FloorTest, ElevatorTest
- Patrick: Parser class, ElevatorRequest class, ParserTest, Exception class
- Zak: Integration of system and system testing, revisions

Everyone took part in major code reviews and approved pull requests.

## APPENDIX A

### Iteration 5





















































ECSS-102	Documentation checklist			=	IN PROGRESS	Unresolved	Apr 10, 2023	Apr 10, 2023
ECSS-101	Duplicate print out for completed tasks for schedulerSubsystem			=	IN PROGRESS	Unresolved	Apr 10, 2023	Apr 10, 2023
ECSS-110	12 to 00-hour time			=	DONE	Done	Apr 10, 2023	Apr 10, 2023
ECSS-109	Add homing state			=	IN PROGRESS	Unresolved	Apr 10, 2023	Apr 10, 2023
ECSS-108	Implement floor GUI components			=	DONE	Done	Apr 9, 2023	Apr 10, 2023
ECSS-107	Allow commit of files in resources directory w/o forcing			✓	DONE	Done	Apr 4, 2023	Apr 4, 2023
ECSS-106	Set timestamp dates to work with daylight savings time			=	IN REVIEW	Unresolved	Apr 4, 2023	Apr 4, 2023
ECSS-105	Add test mode to disable elevator state transition via timeout			=	DONE	Done	Apr 4, 2023	Apr 4, 2023
ECSS-104	Send arrival notif at every state change			=	DONE	Done	Apr 3, 2023	Apr 3, 2023
ECSS-103	Implement GUI code			=	DONE	Done	Mar 31, 2023	Apr 9, 2023
ECSS-102	Measure the performance of the Scheduler subsystem			=	TO DO	Unresolved	Mar 29, 2023	Mar 29, 2023
ECSS-101	Add descriptive logging of events and elevator context			=	TO DO	Unresolved	Mar 29, 2023	Mar 30, 2023
ECSS-100	Add javadoc			=	IN REVIEW	Unresolved	Mar 29, 2023	Apr 10, 2023
ECSS-99	Handle packet loss in all subsystems			=	TO DO	Unresolved	Mar 29, 2023	Mar 30, 2023
ECSS-98	Verify and improve job scheduling algorithm			=	DONE	Done	Mar 29, 2023	Apr 10, 2023
ECSS-97	Scheduler Subsystem			=	DONE	Done	Mar 29, 2023	Apr 10, 2023
ECSS-96	Handle new error column value from incoming Elevator Request messages			=	DONE	Done	Mar 29, 2023	Apr 4, 2023
ECSS-95	Update Parser to handle error column in input file			=	DONE	Done	Mar 29, 2023	Apr 4, 2023
ECSS-94	Add unit tests			=	IN PROGRESS	Unresolved	Mar 29, 2023	Apr 10, 2023

### Iteration 4

ECSS-93	Verify elevator job queuing algorithm			=	TO DO	Unresolved	Mar 29, 2023	Apr 1, 2023
ECSS-92	Elevator Subsystem			=	TO DO	Unresolved	Mar 29, 2023	Mar 29, 2023
ECSS-91	Create design doc for Floor subsystem			=	TO DO	Unresolved	Mar 29, 2023	Mar 30, 2023
ECSS-90	Floor Subsystem			=	TO DO	Unresolved	Mar 29, 2023	Mar 30, 2023
ECSS-89	Create design doc for GUI Subsystem			=	DONE	Done	Mar 29, 2023	Apr 9, 2023
ECSS-88	GUI Subsystem			=	TO DO	Unresolved	Mar 29, 2023	Mar 31, 2023
ECSS-87	Data transfer object for Floor Subsystem -> GUI Subsystem			=	DONE	Done	Mar 29, 2023	Apr 10, 2023
ECSS-86	Data transfer object for Elevator Subsystem -> GUI Subsystem			=	DONE	Done	Mar 29, 2023	Mar 30, 2023
ECSS-85	Integration & Interfacing			=	TO DO	Unresolved	Mar 29, 2023	Mar 29, 2023
ECSS-84	Completed requests are received after all requests have been sent			=	TO DO	Unresolved	Mar 22, 2023	Mar 30, 2023
ECSS-82	Scheduler in the elevator subsystem is not the same as the one in scheduler subsystem			=	TO DO	Unresolved	Mar 19, 2023	Mar 30, 2023
ECSS-81	Elevator doesn't open and close doors when picking up users			=	DONE	Done	Mar 18, 2023	Mar 19, 2023
ECSS-80	Improve logging with multiple elevators			✓	DONE	Done	Mar 18, 2023	Apr 10, 2023
ECSS-79	Improve logging detail in the UDP class			✓	TO DO	Unresolved	Mar 17, 2023	Apr 4, 2023

### Iteration 3

ECSS-78	Update Work Distribution Document			=	IN PROGRESS	Unresolved	Mar 11, 2023	Mar 11, 2023
ECSS-77	Update README			=	IN PROGRESS	Unresolved	Mar 11, 2023	Mar 11, 2023
ECSS-76	Update State Diagrams			=	DONE	Done	Mar 11, 2023	Mar 11, 2023
ECSS-75	Update Sequence UML			=	DONE	Done	Mar 11, 2023	Mar 11, 2023
ECSS-74	Update UML			=	DONE	Done	Mar 11, 2023	Mar 11, 2023
ECSS-73	Create method: sort elevatorRequest by time stamp before adding to arraylist			=	DONE	Done	Mar 10, 2023	Mar 10, 2023

	ECSS-72	Implement distributed processes - method can be execute on different computers	 Trong Nguyen	 Trong Nguyen	=		Done	Mar 5, 2023	Mar 10, 2023
	ECSS-71	Create method: Fill elevatorRequest String's timestamp position with 0s to 3 digits	 Patrick Liu	 Patrick Liu	=		Done	Mar 5, 2023	Mar 5, 2023
	ECSS-70	Action for workflow and State	 Unassigned	 Bobby Ngo	=		Unresolved	Mar 5, 2023	Mar 5, 2023
	ECSS-69	Documentation	 Trong Nguyen	 Zakaria Ismail	⬇		Unresolved	Mar 1, 2023	Mar 11, 2023
	ECSS-68	Create multiple floors and elevators with each elevator being a separate thread	 Hussein El Mokdad	 Hussein El Mokdad	=		Unresolved	Mar 1, 2023	Mar 5, 2023
	ECSS-67	Make the elevator move to each floor instead of teleporting	 Bobby Ngo	 Bobby Ngo	=		Done	Mar 1, 2023	Mar 5, 2023
	ECSS-66	Define simple error handling	 Unassigned	 Trong Nguyen	⬇		Unresolved	Feb 27, 2023	Mar 1, 2023
	ECSS-65	Improve parser	 Patrick Liu	 Trong Nguyen	=		Done	Feb 27, 2023	Mar 5, 2023
	ECSS-63	Implement scheduling sweeping algorithm + testing	 Zakaria Ismail	 Trong Nguyen	=		Unresolved	Feb 27, 2023	Mar 11, 2023
	ECSS-62	Console UI integration with Static Model of Domain	 Bobby Ngo	 Trong Nguyen	=		Unresolved	Feb 27, 2023	Mar 6, 2023
	ECSS-61	Implement Remote Procedure Calls between Classes	 Trong Nguyen	 Trong Nguyen	⬆		Done	Feb 27, 2023	Mar 10, 2023
	ECSS-60	Data structure for reading timestamp events and input in the system	 Trong Nguyen	 Trong Nguyen	⬇		Unresolved	Feb 27, 2023	Mar 7, 2023
	ECSS-59	Iteration 3	 Unassigned	 Zakaria Ismail	⬆		Unresolved	Feb 22, 2023	Feb 22, 2023

## Iteration 2

	ECSS-58	Javadocs + final edits	Unassigned	Trong Nguyen	IN REVIEW	Unresolved	Feb 23, 2023	Feb 23, 2023
	ECSS-57	Proposal to refactor Elevator state machine implementation	Unassigned	Zakaria Ismail	TO DO	Unresolved	Feb 22, 2023	Feb 22, 2023
	ECSS-56	Move Parser package into Floor package	Unassigned	Zakaria Ismail	DONE	Done	Feb 21, 2023	Feb 23, 2023
	ECSS-55	Sending Elevator Location back to the Scheduler After Reaching Stop State	Unassigned	Patrick Liu	DONE	Done	Feb 20, 2023	Feb 22, 2023
	ECSS-54	Improve Elevator State machine logic	Unassigned	Bobby Ngo	DONE	Done	Feb 20, 2023	Feb 22, 2023
	ECSS-52	Implement SchedulerState enum based on StateMachine diagram	Unassigned	Trong Nguyen	DONE	Done	Feb 18, 2023	Feb 21, 2023
	ECSS-51	Implement ElevatorState enum based on StateMachine diagram	Unassigned	Trong Nguyen	DONE	Done	Feb 18, 2023	Feb 21, 2023
	ECSS-50	SchedulerState - Unit testing state machine implementation	Trong Nguyen	Trong Nguyen	DONE	Done	Feb 8, 2023	Feb 20, 2023
	ECSS-49	ElevatorState - Unit Testing state machine implementation	Trong Nguyen	Trong Nguyen	DONE	Done	Feb 8, 2023	Feb 20, 2023
	ECSS-48	Unit testing - Iteration 2	Unassigned	Trong Nguyen	DONE	Done	Feb 8, 2023	Feb 20, 2023
	ECSS-47	ELEVATOR - State machine diagram	Trong Nguyen	Trong Nguyen	DONE	Done	Feb 8, 2023	Feb 20, 2023
	ECSS-46	SCHEDULER - State machine diagram	Trong Nguyen	Trong Nguyen	DONE	Done	Feb 8, 2023	Feb 20, 2023
	ECSS-45	README - update	Bobby Ngo	Trong Nguyen	DONE	Done	Feb 8, 2023	Feb 22, 2023
	ECSS-44	Distribution of Responsibilities	Bobby Ngo	Trong Nguyen	DONE	Done	Feb 8, 2023	Feb 22, 2023
	ECSS-43	UML Sequence Diagram - update	Patrick Liu	Trong Nguyen	DONE	Done	Feb 8, 2023	Feb 22, 2023
	ECSS-42	UML Class Diagram - update	Patrick Liu	Trong Nguyen	DONE	Done	Feb 8, 2023	Feb 22, 2023
	ECSS-41	Documentation - Iteration 2	Trong Nguyen	Trong Nguyen	IN PROGRESS	Unresolved	Feb 8, 2023	Feb 22, 2023
	ECSS-40	Update UML Class diagram	Bobby Ngo	Bobby Ngo	DONE	Done	Feb 4, 2023	Feb 4, 2023
	ECSS-39	Improve console logging UI	Hussein El Mokdad	Bobby Ngo	DONE	Done	Feb 4, 2023	Feb 22, 2023
	ECSS-38	Review the output logging and add improvements to the presentation if possible	Bobby Ngo	Zakaria Ismail	TO DO	Unresolved	Feb 4, 2023	Feb 4, 2023
	ECSS-37	Add sleep timer to allow the user to see the system interactions	Bobby Ngo	Zakaria Ismail	TO DO	Unresolved	Feb 4, 2023	Feb 4, 2023

## Iteration 1

Type	Key ↑	Summary	Assignee	Reporter	P	Status	Resolution	Created	Updated
	ECSS-1	Setup tasks	Bobby Ngo	Bobby Ngo	=	DONE ✓	Done	Jan 15, 2023	Feb 3, 2023
	ECSS-2	Iteration 1 Implementation	Unassigned	Patrick Liu	=	TO DO ▾	Unresolved	Jan 18, 2023	Jan 25, 2023
	ECSS-4	Submit Iteration 1 on BrightSpace	Trong Nguyen	SYSC3303 Project...	=	TO DO ▾	Unresolved	Jan 18, 2023	Feb 4, 2023
	ECSS-5	Elevator class	Trong Nguyen	SYSC3303 Project...	=	DONE ✓	Done	Jan 18, 2023	Feb 2, 2023
	ECSS-6	Scheduler Class	Bobby Ngo	SYSC3303 Project...	=	DONE ✓	Done	Jan 18, 2023	Jan 29, 2023
	ECSS-7	Floor class	Hussein El Mokdad	SYSC3303 Project...	=	DONE ✓	Done	Jan 18, 2023	Jan 29, 2023
	ECSS-8	Complete README.txt	Bobby Ngo	SYSC3303 Project...	=	IN REVIEW ▾	Unresolved	Jan 18, 2023	Feb 3, 2023
	ECSS-9	Iteration 1 - Breakdown of Responsibilities	Trong Nguyen	SYSC3303 Project...	=	DONE ✓	Done	Jan 18, 2023	Feb 3, 2023
	ECSS-10	Iteration 1 - UML Class Diagram & Sequence Diagrams	Trong Nguyen	SYSC3303 Project...	=	DONE ✓	Done	Jan 18, 2023	Feb 4, 2023
	ECSS-11	Verify JavaDoc & Meaningful Comments	Trong Nguyen	SYSC3303 Project...	=	DONE ✓	Done	Jan 18, 2023	Feb 4, 2023
	ECSS-12	Verify Unit Testing for all Classes	Trong Nguyen	SYSC3303 Project...	=	IN PROGRESS ▾	Unresolved	Jan 18, 2023	Feb 4, 2023
	ECSS-13	Initial Environment Setup	Zakaria Ismail	Zakaria Ismail	=	DONE ✓	Done	Jan 20, 2023	Jan 29, 2023
	ECSS-14	Configure CI/CD Automated Testing	Unassigned	Zakaria Ismail	≡	TO DO ▾	Unresolved	Jan 21, 2023	Jan 24, 2023
	ECSS-15	Iteration 0 Results Processing	Trong Nguyen	Zakaria Ismail	=	DONE ✓	Done	Jan 21, 2023	Feb 3, 2023
	ECSS-16	Configure Logging	Unassigned	Zakaria Ismail	≡	TO DO ▾	Unresolved	Jan 21, 2023	Jan 26, 2023
	ECSS-17	Input File Parser and Tests	Patrick Liu	Patrick Liu	^	DONE ✓	Done	Jan 23, 2023	Feb 2, 2023
	ECSS-18	Fix/Setup Relative Filepath for input.txt file	Unassigned	Zakaria Ismail	≡	DONE ✓	Done	Jan 24, 2023	Jan 29, 2023
	ECSS-19	Setup config.properties file to select input file	Unassigned	Zakaria Ismail	≡	TO DO ▾	Unresolved	Jan 24, 2023	Jan 26, 2023
	ECSS-20	Unit test main.parser.Parser class	Patrick Liu	Zakaria Ismail	=	DONE ✓	Done	Jan 24, 2023	Feb 3, 2023
	ECSS-21	Unit test main.java.dto.ElevatorRequest class	Patrick Liu	Zakaria Ismail	=	DONE ✓	Done	Jan 24, 2023	Feb 3, 2023
	ECSS-22	README file	Trong Nguyen	Bobby Ngo	=	IN PROGRESS ▾	Unresolved	Jan 25, 2023	Feb 3, 2023
	ECSS-23	Create DOCs folder and include UML files	Hussein El Mokdad	Hussein El Mokdad	=	DONE ✓	Done	Jan 25, 2023	Feb 4, 2023
	ECSS-24	.gitignore for IntelliJ	Zakaria Ismail	Zakaria Ismail	=	DONE ✓	Done	Jan 25, 2023	Jan 25, 2023
	ECSS-25	Setup custom exception class with centralized error messages and refactor exception throws	Unassigned	Zakaria Ismail	▾	TO DO ▾	Unresolved	Jan 26, 2023	Jan 26, 2023
	ECSS-26	Unit test main.java.floor.Floor class	Unassigned	Zakaria Ismail	=	DONE ✓	Done	Jan 29, 2023	Feb 3, 2023
	ECSS-27	Integrate Iteration 1 Components	Unassigned	Zakaria Ismail	^	TO DO ▾	Unresolved	Jan 29, 2023	Feb 3, 2023
	ECSS-28	Phase 1 Component Integration - Parser, Floor, Elevator, Scheduler	Zakaria Ismail	Zakaria Ismail	^	DONE ✓	Done	Jan 29, 2023	Feb 2, 2023
	ECSS-30	Bi-directional Communication Implementation	Zakaria Ismail	Zakaria Ismail	^	DONE ✓	Done	Feb 2, 2023	Feb 4, 2023
	ECSS-31	Iteration 2 setup	Unassigned	Trong Nguyen	=	TO DO ▾	Unresolved	Feb 3, 2023	Feb 3, 2023
	ECSS-32	Verify that program can read the input file and pass the data back and forth	Zakaria Ismail	Zakaria Ismail	^	IN PROGRESS ▾	Unresolved	Feb 3, 2023	Feb 4, 2023
	ECSS-33	Standardize string output to use String.format for variables instead of + concat	Zakaria Ismail	Zakaria Ismail	≡	TO DO ▾	Unresolved	Feb 3, 2023	Feb 4, 2023
	ECSS-34	Added some more content to the readme	Unassigned	Trong Nguyen	=	DONE ✓	Done	Feb 4, 2023	Feb 4, 2023
	ECSS-35	Implement remaining test cases (scheduler, floor, and elevator)	Hussein El Mokdad	Hussein El Mokdad	=	IN PROGRESS ▾	Unresolved	Feb 4, 2023	Feb 4, 2023
	ECSS-36	Documentation breakdown of the responsibilities of each team member for iteration 1	Trong Nguyen	Trong Nguyen	=	IN PROGRESS ▾	Unresolved	Feb 4, 2023	Feb 4, 2023