21COA202 Coursework

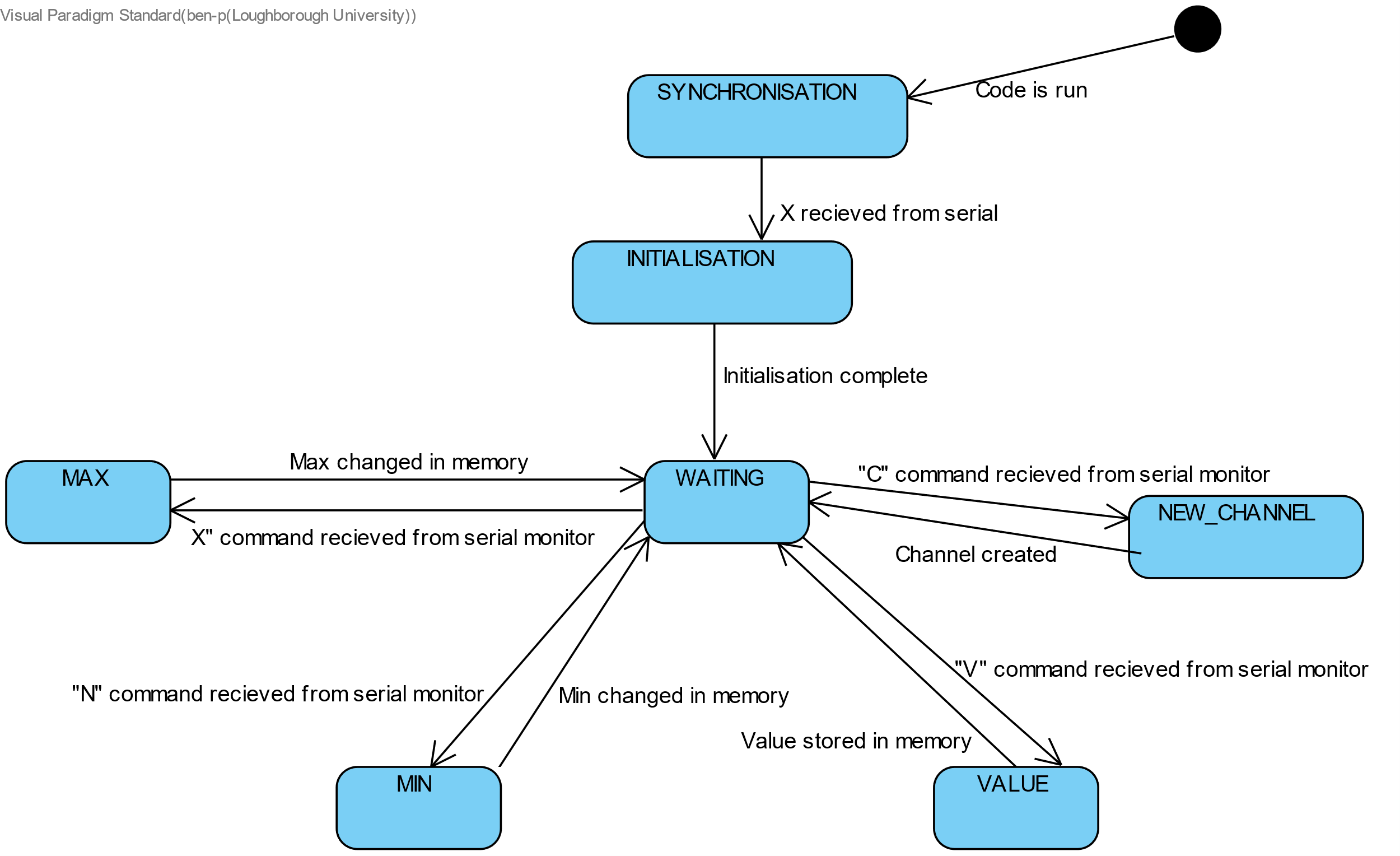
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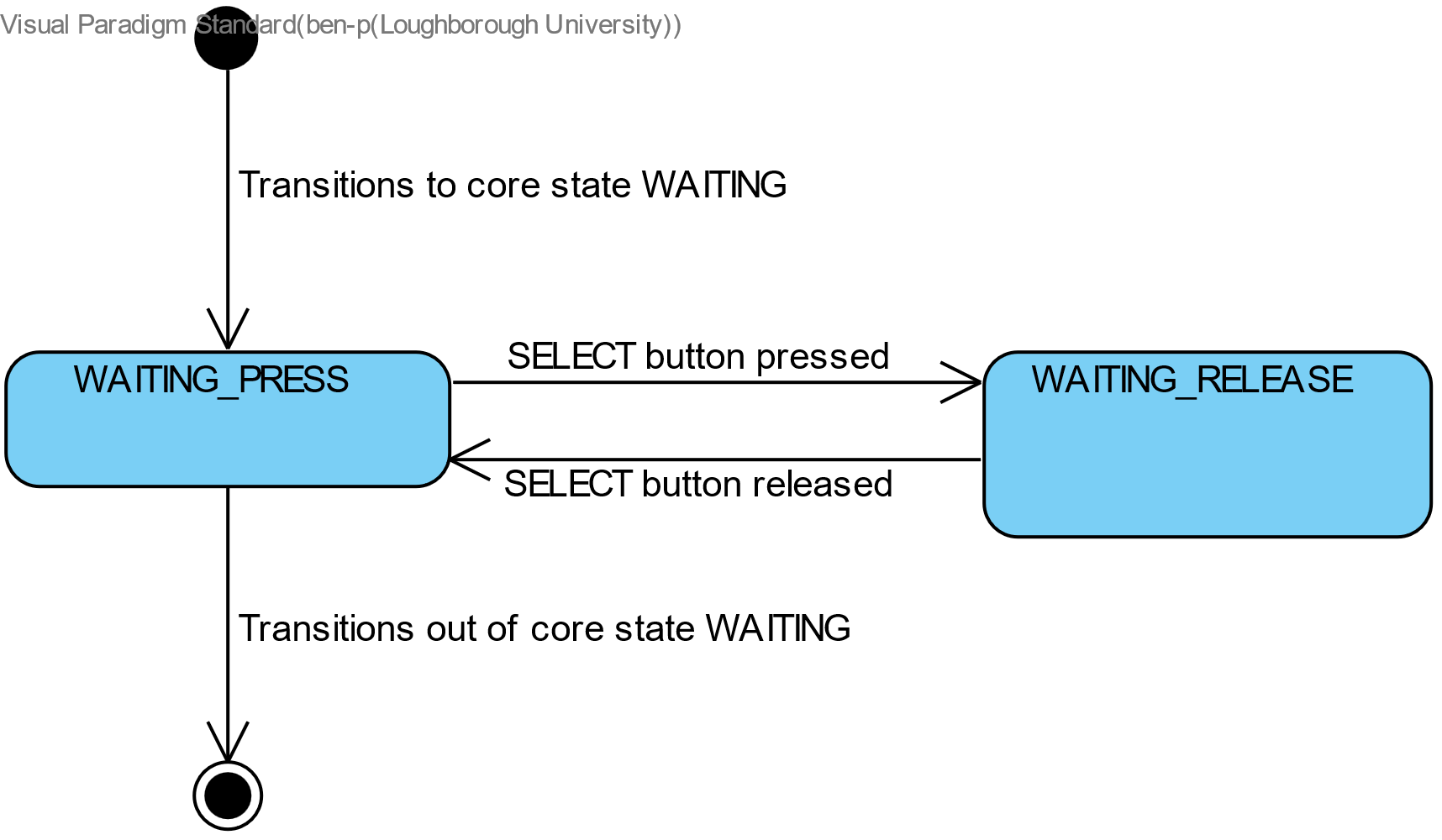
Semester 2

* *In this template delete all the text in italics and replace with your own as appropriate.*
* *Delete Semester 2 or SAP from the Date above as appropriate.*
* *Add your id number above*
* *There is no need to write an introduction here*

# 1 FSMs

This is the core finite state machine which I implemented for this project. It uses 7 states, each handling one of the main operations of the system:

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This is a sub FSM which I implemented to handle the behaviour of the SELECT button when holding and releasing it to display different screens on the lcd:

# 2 Data structures

* *Describe the data structures you are using to implement the Coursework. These could be types (structures, enums), classes and constants. Also describe the variables that are instances of these classes or types.*
* *When you have functions to update the global data structures/store, list these with a sentence description of what each one does.*

To store the data associated with each channel, I have defined my own structure named “channel” \*\* *line 17*\*\*, which consists of a char “id”, char array “description”, int “value”, int “min” and int “max. I have used an array of size 26 and type “channel” named “channelArray”, to hold each of the 26 possible channels and their data \*\**line 62*\*\*. This array is sorted using a bubble sort \*\**line 476*\*\*each time a new channel is added to ensure that all channel data is stored in alphabetical order to simplify other tasks.

To handle the FSM functionalities, I have defined two enums: state\_e containing “SYNCHRONISATION”, “INITIALISATION”, “WAITING”, “NEW\_CHANNEL”, “VALUE”, “MAX”, “MIN” \*\* *line 58*\*\*, which is initialized as “state” \*\**on* *line 322*\*\* and state\_b containing “WAITING\_PRESS” and “WAITING\_RELEASE” \*\* *line 59*\*\*, which is initialized as “buttonState” \*\**on line 362*\*\*.

I didn’t create functions to update the global channelArray, however each state updates the array instead, details are below:

NEW\_CHANNEL: Either updates the description of the pre-existing channel with the entered channel id, or creates a new entry to the array, adding the channel id and description. Also sorts the array each run through.

VALUE: Updates the stored value in the array for the corresponding channel id. If no such channel has been intialised, it makes no changes.

MAX: Updates the stored max value in the array for the entered corresponding channel id. If no channel with that id has been created, it makes no changes.

MIN: Updates the stored min value in the array for the entered corresponding channel id. If no channel with that id has been created, it makes no changes.

# 3 Debugging

* *if you have code used to help you debug that is now commented out or managed by C macros, then keep this in your submission. If you have other things to say, then put them here.*

# 4 Reflection

* *200–500 words of reflection on your code. Include those things that don’t work as well as you would like and how you would fix them.*

# Extension Features

* *For each extension feature you have implemented describe the additional code and changes to your FSM . Give examples of types, variables and code that is important.*
* *do not write anything here–put it in the subsections following.*
* ***Delete the text from Extension Features to here***

# 5 UDCHARS

*Write about this extension*

# 6 FREERAM

*Write about this extension*

# 7 HCI

*Write about this extension*

# 8 EEPROM

*Write about this extension*

# 9 RECENT

*Write about this extension*

# 10 NAMES

*Write about this extension*

# 11 SCROLL

*Write about this extension*

# 12 Submission

* *After following the instructions,* ***delete this section and ALL the subsequent sections from your report****.*
* Prepare the report as a PDF.\*

## 12.1 From Word source

If you have prepared this using the Word template then use the styles Heading 1 and Heading 2 for each section and subsection. It should create a new page for each Heading 1 and Heading 2. Please check this is the case.

## 12.2 From Markdown source

If you are preparing this in markdown, then I applaud you. To convert to a PDF use the pandoc and LaTeX software (available from <https://pandoc.org/> and <https://tug.org/texlive/>). pandoc is installed in the N001/2/3 labs under both MacOS and Windows.

pandoc -N -o output.pdf --template=coa202.latex input.md --shift-heading-level-by=-1

coa202.latex is available from LEARN. This works for me with pandoc version 2.11.4.\* and later versions.

## 12.3 Gradescope Tagging

After deleting the sections from submission onwards there should be a tag on every page. If you have an untagged page, then find a tag for it. There are tags for the title page, data structure pages, fsms, testing and each extension.