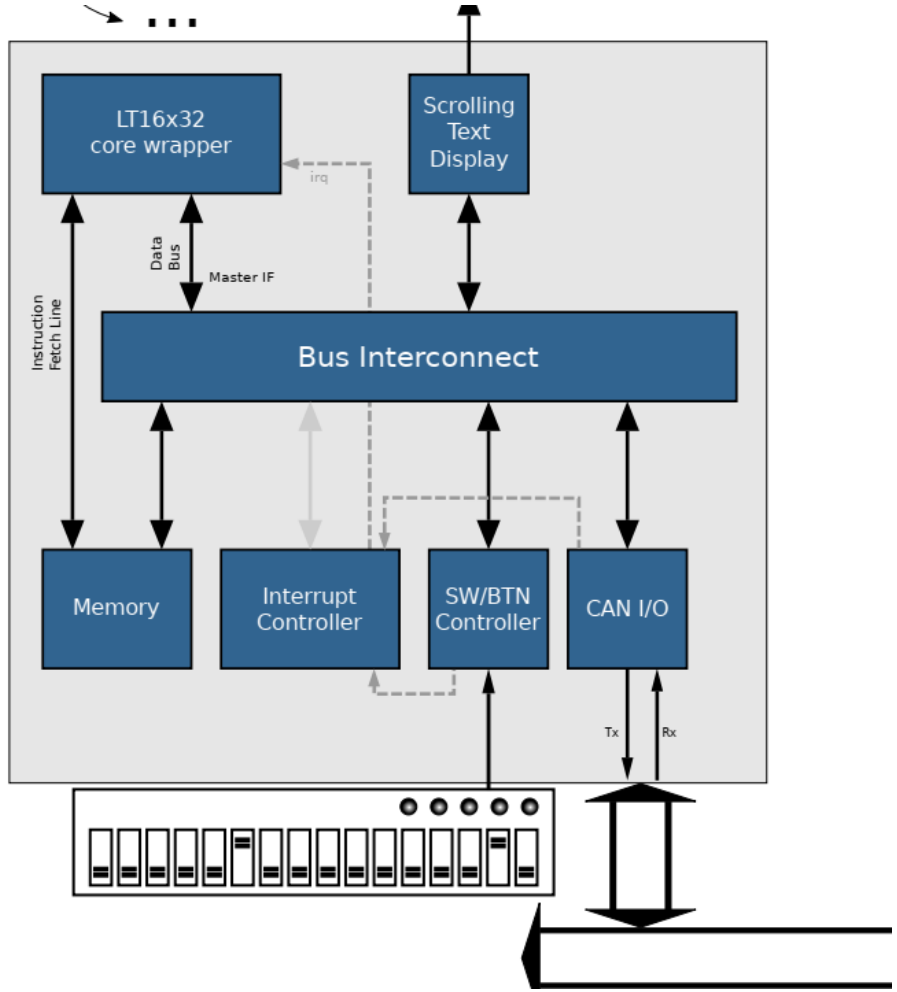
ESY lab Project

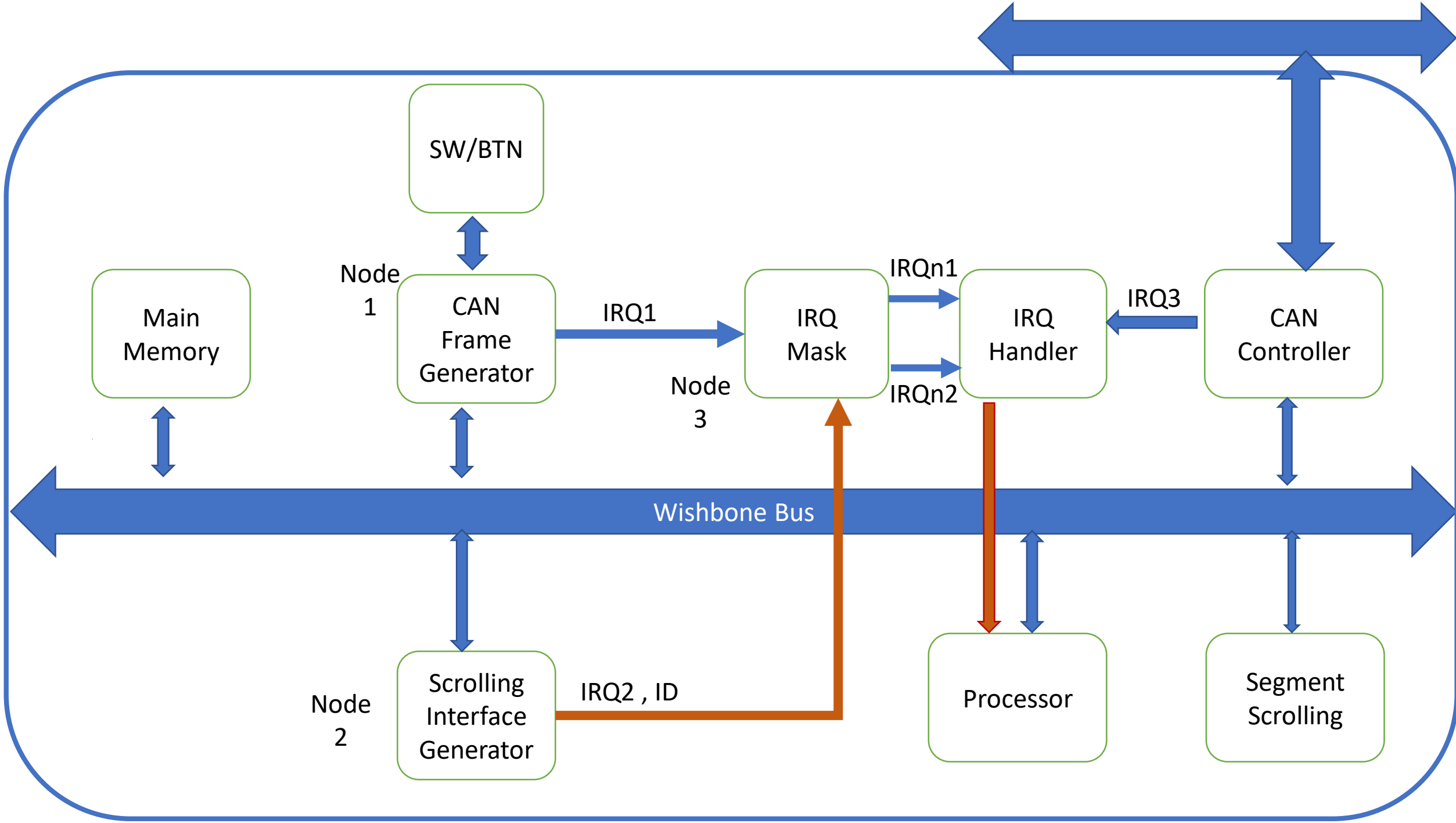
By Group 2

Part1: Hardware-software-partitioning

- (To be added) Hardware parts:
  - CAN frame generator
  - Scrolling interface generator
  - IRQ mask and timers

- Software parts:
  - Interrupt handler for IRQn1 for sending the generated CAN frame to CAN controller and give the CAN frame to interface generator
  - Interrupt handler for IRQn2 for writing to the buffer of 7-segment display
  - Interrupt handler for IRQ 3 for handling the received CAN frame to scrolling interface generator




SW/BTN
Node
1
CAN
Frame
Generator
IRQ1
IRQ
Mask
IRQn1
IRQn2
IRQ
Handler
IRQ3
CAN
Controller
Main
Memory
Node
3
Wishbone Bus
Node
2
Scrolling
Interface
Generator
IRQ2 , ID
Processor
Segment
Scrolling

Component Definition:

CAN frame generator :

It generates data frame for CAN bus based on states of buttons and switches.

Scrolling interface generator:

It generates data interface for 7-segment display.

IRQ mask:

It decides based on IRQ1, IQR2,ID,busy and timer whether it sends IRQn1 or IRQn2 to the interrupt handler. It consists of 2timers, which are t1 and t2 that are responsible for avoiding racing condition and ensuring continuity of writing digits respectively.

Component Definition:

IRQ1: Notify when data frame for CAN bus is finished.
IRQ2: Notify when the data interface for 7-segment display is finished.
IRQ3: Notify when receive CAN frame from other clients.

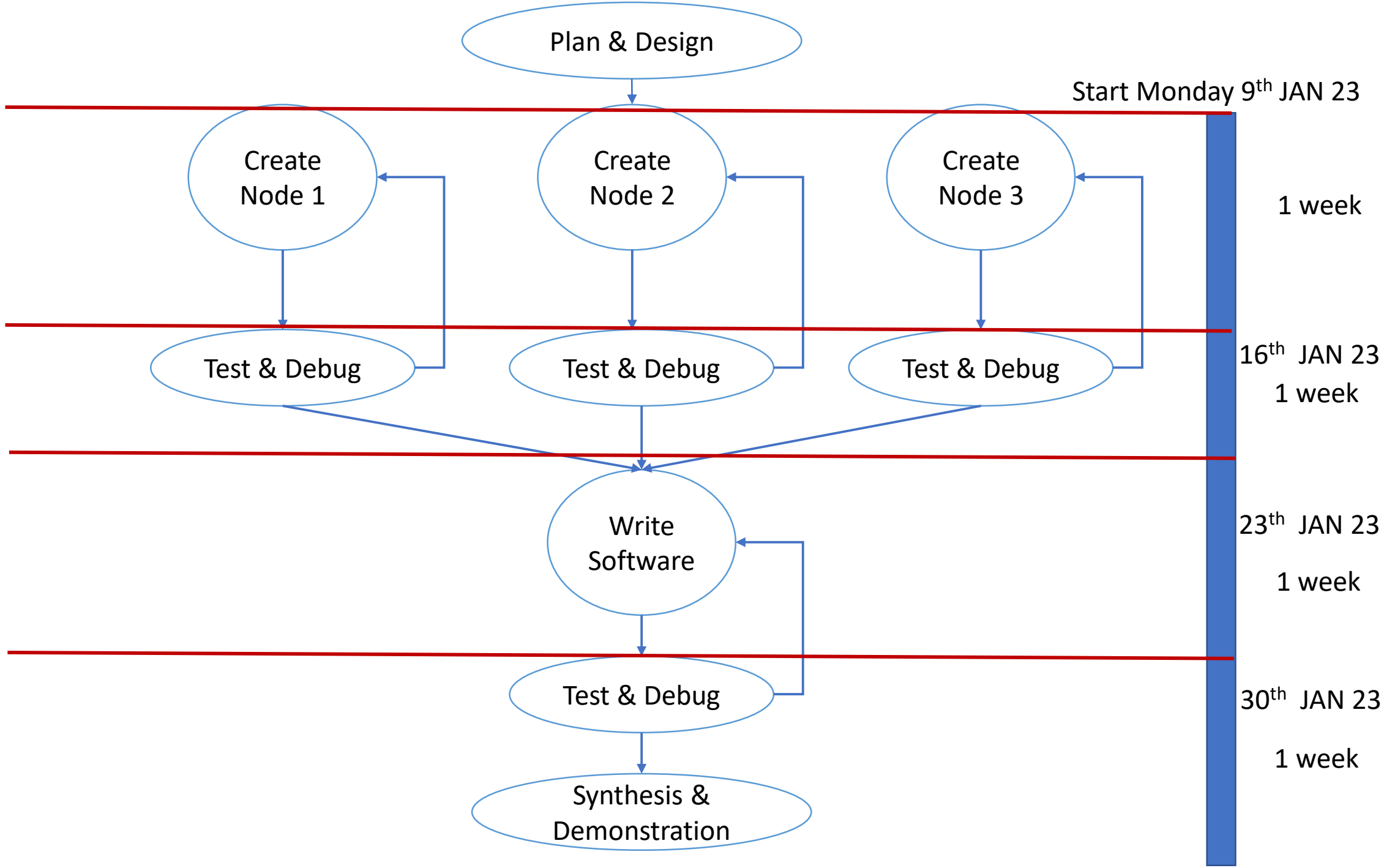
ID: Define user who sends the CAN frame.

Busy: Define whether any client is writing .
Set busy=1 when IRQ2=1 and ID=busy ID then start timer t2.
Set buy=0 when timer t2=0.
Busy ID: Defines which client is writing when busy=1.

Timer t2: It runs 10 seconds after busy is set to 1.
Timer t1: It runs for approximately 100 cycles. Is used for avoiding racing condition.
Set t1=1 when IRQ1 =1 and busy=0.
Set t1=0 when IRQ2=1 and ID is not busy ID.

Tasks

- Software (Interrupt handlers) by Zimin
- Hardware
  - CAN frame generator (define functions for SW and BTN, generate ID, Control and Data fields for CAN controller) by Napatsorn
  - Scrolling interface generator(take data and ID as input and generate interface for scrolling 7-Segment according to the interface from warmup task, output IRQ2 and ID) by Tuhin
  - IRQ mask and timers (pass or mask the interrupt base on timer, busy ID and busy bit) by Kamal
- Simulation & Verification: all together


Plan & Design
Start Monday 9th JAN 23
Create Node 1
Create Node 2
Create Node 3
1 week
Test & Debug
Test & Debug
Test & Debug
16th JAN 23
1 week
Write Software
23th JAN 23
1 week
Test & Debug
30th JAN 23
1 week
Synthesis & Demonstration