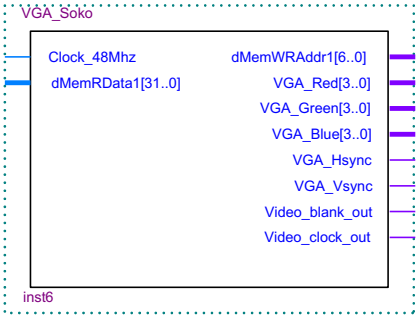
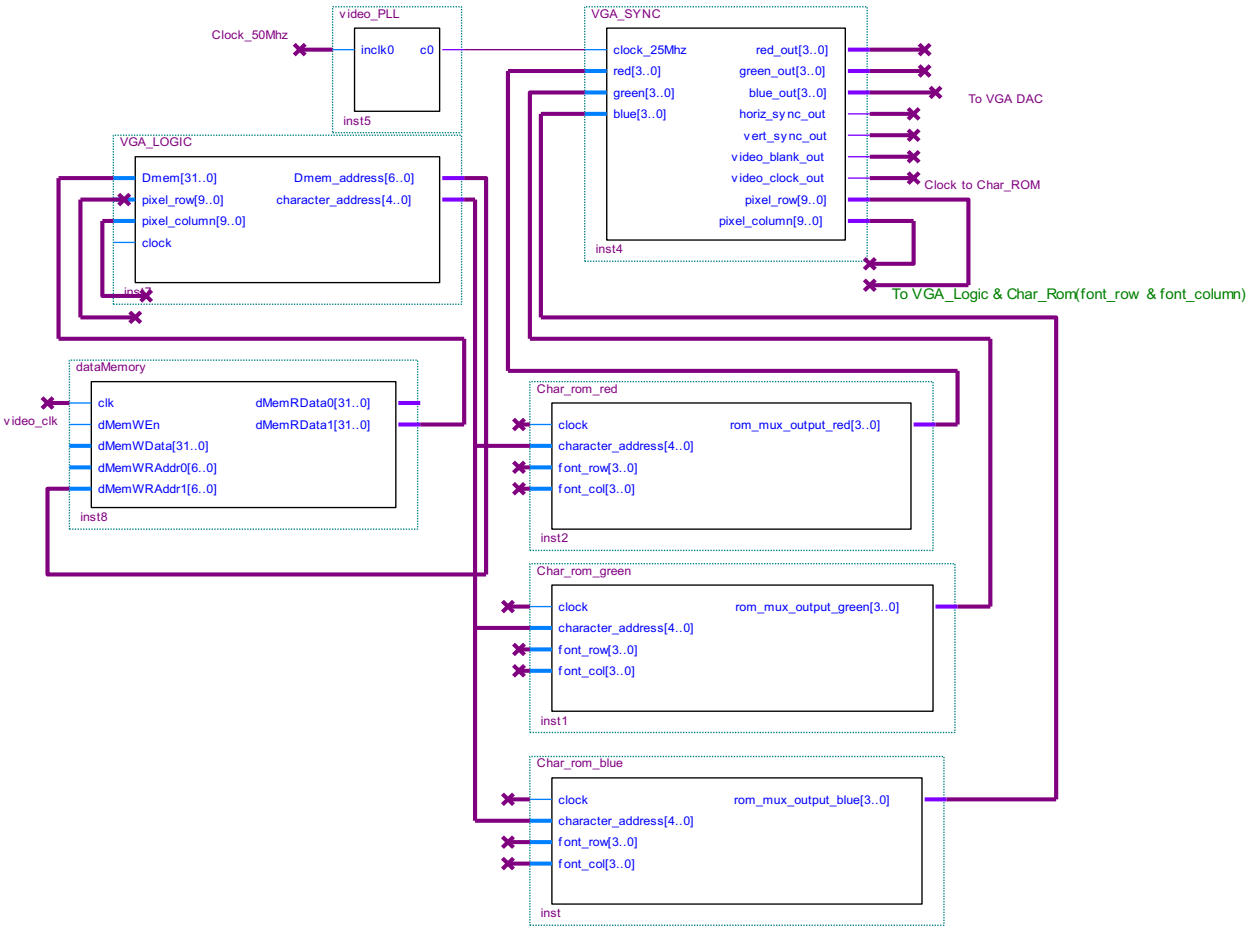
## VGA Game Interface

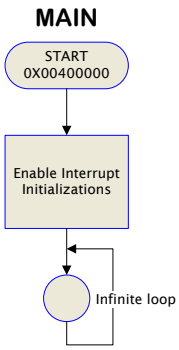



Top Entity of VGA Interface

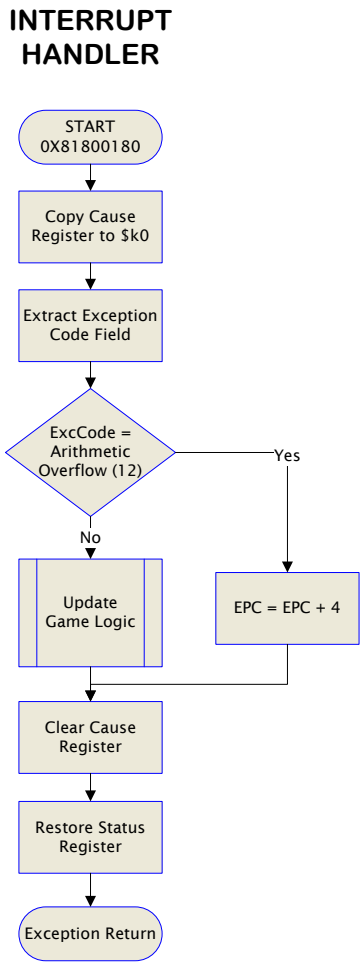
The VGA Game interface main function is to display the state of the game environment, which is located in the data memory. The address of data memory to be read is generated by VGA_Logic module. VGA_Logic determine the data memory address according to the location of the pixel. This pixel location is given from VGA_Sync module. From this state data, VGA_Logic generates the *character_address* input of character ROM. The ROM then sends 4-bit RGB data to VGA_Sync, which renders these video signals.



**Sokoban Game Implementation**

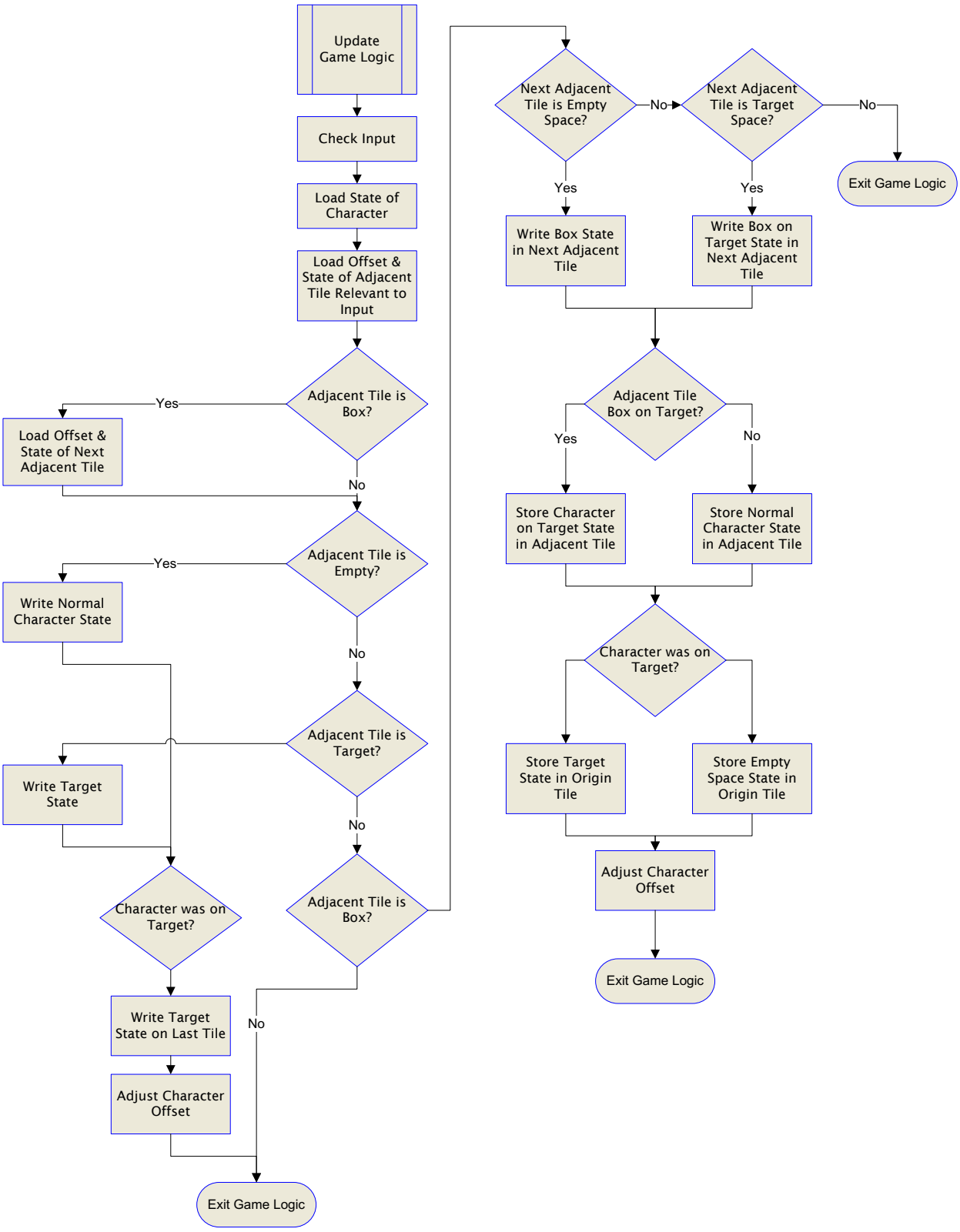



The main function initializes registers and enables interrupt. It then infinitely loops waiting for external interrupt. It may also check for the winning condition.




The Interrupt Handler contains an arithmatic overflow exception handler as it is a basic feature of a handler routine. The handler increments the EPC to make the processor skip the fault instruction. If the interrupt originates from the input, the processor will execute game logic subroutine.

# GAME LOGIC


Update Game Logic
Check Input
Load State of Character
Load Offset & State of Adjacent Tile Relevant to Input
Adjacent Tile is Box?
Yes
Load Offset & State of Next Adjacent Tile
No
Adjacent Tile is Empty?
Yes
Write Normal Character State
No
Adjacent Tile is Target?
Write Target State
No
Character was on Target?
Adjacent Tile is Box?
Write Target State on Last Tile
Adjust Character Offset
No
Exit Game Logic
Next Adjacent Tile is Empty Space?
No
Next Adjacent Tile is Target Space?
No
Exit Game Logic
Yes
Write Box State in Next Adjacent Tile
Yes
Write Box on Target State in Next Adjacent Tile
Adjacent Tile Box on Target?
Yes
Store Character on Target State in Adjacent Tile
No
Store Normal Character State in Adjacent Tile
Character was on Target?
Store Target State in Origin Tile
Store Empty Space State in Origin Tile
Adjust Character Offset
Exit Game Logic

The game logic subroutine main function is to update the data memory according to the input. The game logic specifies the rules of the game. It always loads the current state of the character, the location of the character, the location (in memory) and state (value) of adjacent tile relevant to input, and if needed, the next adjacent tile to registers.

**Game Manual**

**States of Game**

Brick Wall

Background

Character

Character on Target

Box

Target

Box on Target

Images