

Introduction to Lab Snake Game

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Snake Games

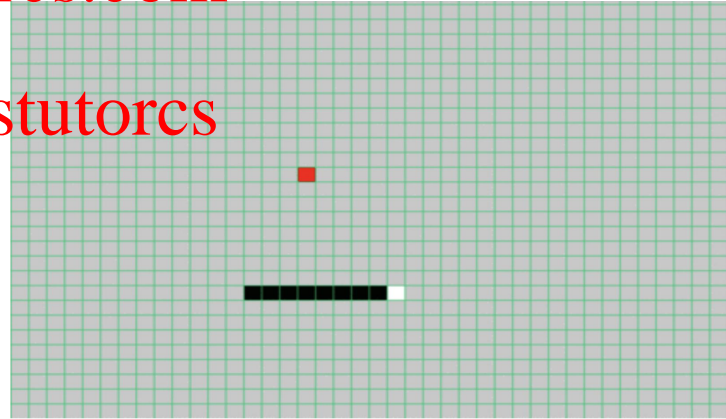
- Snake games available online
- Very famous games



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Our Snake Game is much simpler

- We don't consider the situation when the snake hits its own body. The players just need to avoid this situation while playing this game.
- After the snake eats the apple, the size of the snake body doesn't increase.

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Two Screens

- Preparation Screen:

- Reads the level of the game

- Game Screen.

- Walls
- Apple
- Snake
- Number of points
- Time remaining

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Keyboard and Display MMIO Simulator

DISPLAY: Store to Transmitter Data 0xffff000c, cursor 0, area 117 x 12

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Font

☒ DAD

Fixed transmitter delay, select using slider

Delay length: 5 instruction executions

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KEYBOARD: Characters typed here are stored to Receiver Data 0xffff0004

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Tool Control

Disconnect from Program

Reset

Help

Close

Random Coordinate

The coordinate (row, col) of the apple is randomly generated.

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We need a random number generator.

Linear Congruential Generator

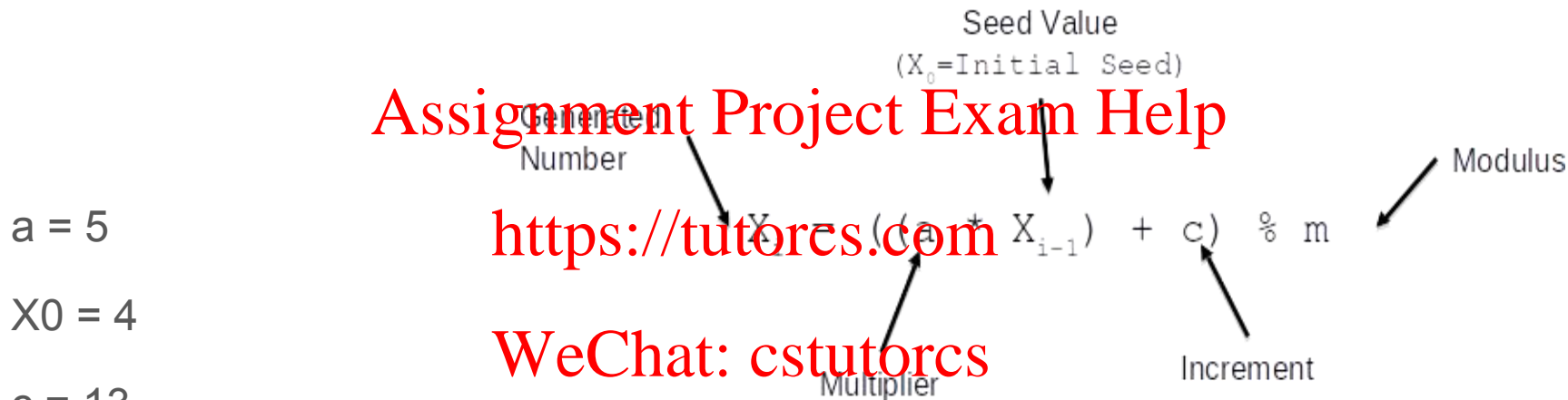
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$$X_i = ((a * X_{i-1}) + c) \% m$$

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Linear Congruential Generator Example



$a = 5$

$X_0 = 4$

$c = 13$

$m = 5$

$X_1 = ((5 * 4) + 13) \% 5 = 3$

$X_2 = ((5 * 6) + 13) \% 5 = ?$

Exceptions/Interruptions

- Enable interrupts for both the timer and the keyboard
- Create an exception handler

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Enable Interrupts

- Keyboard:
 - Keyboard Control - Bit 1 Must be 1 in order for the keyboard to be enabled
 - Must be reenabled after every keyboard interrupt
 - Keyboard Data: Contains the ASCII character after a key is pressed
- Timer:
 - Timer: Contains the current time
 - TimeCMP: User-specified value. When matched by the timer an interrupt is generated
- Interruption Control:
 - Ustatus register: bit 0 must be 1 in order for user interrupts to be allowed
 - Uie: Bits 4 and 8 must be 1 in order to enable keyboard and timer

Exception Handler

The snake.s already contains the Handler Terminate section

The common.s file will already have the jTrapData section

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Saving Registers

An interrupt handler must save all the registers that it uses.

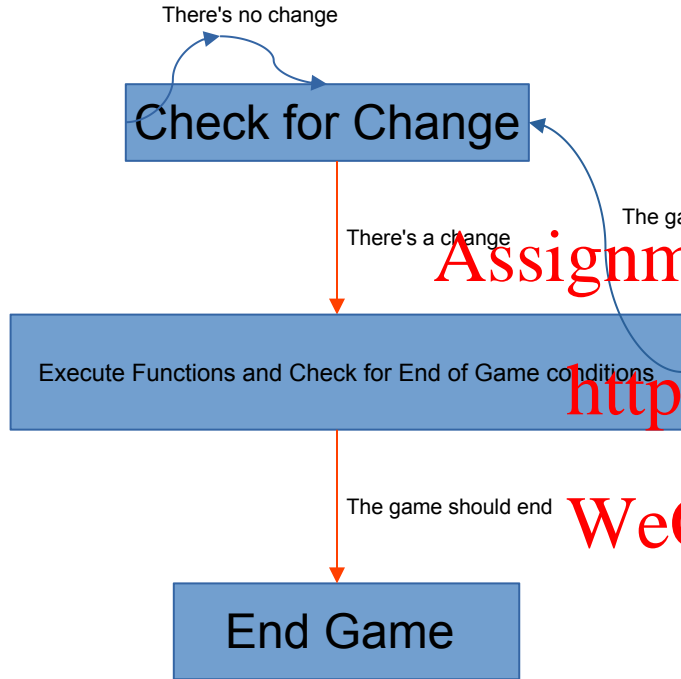
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- The label iTrapData designates a section of memory allocated for saving registers in the handler
- Outside of the handler, uscratch (CSR #64) should contain the address of the iTrapData section.
- Use the cssrw instruction to swap a register with the uscratch and save all the required registers.

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Modified Forever Loop



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