

Introduction to Lab Typing Game

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Typing Games

- Typing games available online
- Teaches Speed and Accuracy

Timed Typing Test

Type as quickly and accurately as possible. If you make a mistake, you can use the backspace key to correct it. When you reach the end of a line, the cursor will automatically advance. Time begins when the first key is pressed.

Lesson: #26 Classic Tales
Time: 1 Minute Timed Typing Test
Font: Medium Font

☐ Two spaces after periods. ☒ Allow backspacing.

Start



Two Screens

- Preparation Screen:
 - Reads the level of the game
- Game Screen:
 - Phrase to be typed
 - Progress bar
 - Number of points
 - Time remaining

Keyboard and Display MMIO Simulator

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

Font



DAD

Fixed transmitter delay, select using slider



Delay length: 5 instruction executions



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

Tool Control

Disconnect from Program

Reset

Help

Close

Random Selection

The phrase to be typed is randomly selected from a list of phrases provided.

We need a random number generator.

Linear Congruential Generator

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

Linear Congruential Generator Example

$$a = 5$$

$$X_0 = 4$$

$$c = 13$$

$$m = 5$$

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

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

Diagram illustrating the Linear Congruential Generator formula:

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

Labels and arrows pointing to the formula components:

- Generated Number: X_i
- Seed Value (X_0 =Initial Seed): X_{i-1}
- Multiplier: a
- Increment: c
- Modulus: m

Exceptions/Interruptions

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

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 typing.s already contains the Handler Terminate section

The common.s file will already have the iTrapData section

Saving Registers

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

- 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.

Array Format

Text File

Phrase Array

Hello

Goodbye

Anna is fun

Sunshine outside

Hell	0x10001000
o Go	0x10001004
odby	0x10001008
e An	0x1000100C
na i	0x10001010
s fu	0x10001014
n Su	0x10001018
nshi	0x1000101C
ne o	0x10001020
utsi	0x10001024
de	0x10001028

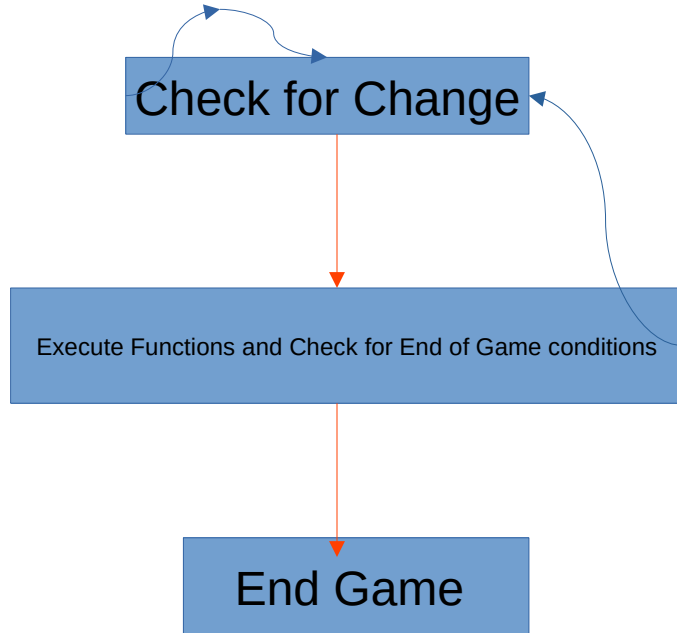
Hell	0x10001000
o Go	0x10001004
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s fu	0x10001014
n Su	0x10001018
nshi	0x1000101C
ne o	0x10001020
utsi	0x10001024
de	0x10001028

This is used to create
the array of pointers



0x10001000	0x10001100
0x10001006	0x10001104
0x1000100E	0x10001108
0x1000101A	0x1000110C

Modified Forever Loop



Modified Forever Loop

Check for Change



```
graph TD; A[Check for Change] --> B[Functions and Check for End of Game conditions];
```



Functions and Check for End of Game conditions