ECGR 4101/5101 - Lecture 10

Embedded app of the day
Hallmark Card - Music player Card

Chapter 4 - Software
1) IDE
2) Debugging
3) Simple use of tools

Integrated Development environment
Many tools in one package
* Compiler
* Linker
* Debugger
* Downloader

* Text Editor
* "Project creator"
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What do you need to know about your embedded system? (Hardware)

* Which microcontroller are you using?
  * Instruction -> Compiler, Debugger
  * Architecture -> Compiler, Debugger
  * Memory -> Linker, Downloader
  * Compiler, Debugger
  * Peripherals -> all of above
  * Libraries/Tools/existing code
  * Definition/Mapping of Hardware
  * I/O devices to ports (OH)

![Diagram]

PC <-> USB <-> H8 Debugger <-> RX62N

Code Written by Renesas
<table>
<thead>
<tr>
<th>Address</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0000 0000h</td>
<td>On-chip RAM</td>
</tr>
<tr>
<td>0001 8000h</td>
<td>Reserved area</td>
</tr>
<tr>
<td>0008 0000h</td>
<td>Peripheral I/O registers</td>
</tr>
<tr>
<td>0010 8000h</td>
<td>On-chip ROM (data flash)</td>
</tr>
<tr>
<td>0010 8000h</td>
<td>Reserved area</td>
</tr>
<tr>
<td>007F 8000h</td>
<td>FCU-RAM³</td>
</tr>
<tr>
<td>007F A000h</td>
<td>Reserved area</td>
</tr>
<tr>
<td>007F C000h</td>
<td>Peripheral I/O registers</td>
</tr>
<tr>
<td>007F C500h</td>
<td>Reserved area</td>
</tr>
<tr>
<td>007F FC00h</td>
<td>Peripheral I/O registers</td>
</tr>
<tr>
<td>0080 0000h</td>
<td>Reserved area</td>
</tr>
<tr>
<td>00F8 0000h</td>
<td>On-chip ROM (program ROM) (write only)</td>
</tr>
<tr>
<td>0100 0000h</td>
<td>Reserved area</td>
</tr>
</tbody>
</table>

- **How much RAM?**
  - 0000 0000 to 0001 7FFF
  - $3,048$ bytes (approx. $96$ Kbytes)

- **Where are our I/O devices located?**
  - (addresses)

```c
#define PORT0 (*(volatile struct st_port0_evenaccess *) 0x8C000)
#define PORT1 (*(volatile struct st_port1_evenaccess *) 0x8C001)
#define PORT2 (*(volatile struct st_port2_evenaccess *) 0x8C002)
#define PORT3 (*(volatile struct st_port3_evenaccess *) 0x8C003)
#define PORT4 (*(volatile struct st_port4_evenaccess *) 0x8C004)
#define PORT5 (*(volatile struct st_port5_evenaccess *) 0x8C005)
#define PORT6 (*(volatile struct st_port6_evenaccess *) 0x8C006)
#define PORT7 (*(volatile struct st_port7_evenaccess *) 0x8C007)
#define PORT8 (*(volatile struct st_port8_evenaccess *) 0x8C008)
#define PORT9 (*(volatile struct st_port9_evenaccess *) 0x8C009)
#define PORTA (*(volatile struct st_porta_evenaccess *) 0x8C00A)
#define PORTB (*(volatile struct st_portb_evenaccess *) 0x8C00B)
#define PORTC (*(volatile struct st_portc_evenaccess *) 0x8C00C)
#define PORTD (*(volatile struct st_portd_evenaccess *) 0x8C00D)
#define PORTE (*(volatile struct st_porte_evenaccess *) 0x8C00E)
#define PORTF (*(volatile struct st_portf_evenaccess *) 0x8C00F)
#define PORTG (*(volatile struct st_portg_evenaccess *) 0x8C010)
```