

μ ARM, Interrupt e Device

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Device

- ▶ Dischi
- ▶ Nastri / USB
- ▶ Interfacce di rete
- ▶ Stampanti
- ▶ Terminali

8 x [ ,  ,  ,  , ]

Dove sono i Device

base address: $(0x40 + dev_type * 256 + dev_num * 32) \dots$

arch.h: DEV_REG_ADDR(line, dev) !

Device Register Generali:

| Field n. | Address | Field Name |
|----------|----------------|----------------|
| 0 | $(base) + 0x0$ | STATUS |
| 1 | $(base) + 0x4$ | COMMAND |
| 2 | $(base) + 0x8$ | DATA0 |
| 3 | $(base) + 0xC$ | DATA1 |

Device Register Terminali:

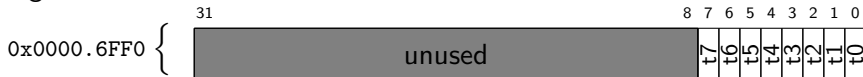
| Field n. | Address | Field Name |
|----------|----------------|-----------------------|
| 0 | $(base) + 0x0$ | RECV_STATUS |
| 1 | $(base) + 0x4$ | RECV_COMMAND |
| 2 | $(base) + 0x8$ | TRANSM_STATUS |
| 3 | $(base) + 0xC$ | TRANSM_COMMAND |

Interrupts

Interrupt vector:

| | | |
|--------|--|-----------|
| 0x6FE0 | | Disks |
| 0x6FE4 | | Tapes |
| 0x6FE8 | | Network |
| 0x6FEC | | Printers |
| 0x6FF0 | | Terminals |

e.g. Terminals:



se $(t5 == 1) \Rightarrow$ interrupt pendente sulla linea del terminale 5

Altre aree interessanti

| Address | Function |
|------------|--------------------------|
| 0x00000020 | Installed Devices Vector |
| 0x000002DC | Time of Day (Hi) |
| 0x000002E0 | Time of Day (Low) |
| 0x000002E4 | Interval Timer |
| 0x00007000 | Exception States Vector |

Exception States Vector:

(uARMconst.h)

| | | |
|--------|---------------|---------------|
| 0x7000 | INTERRUPT_OLD | INTERRUPT_NEW |
| 0x70B0 | TLB_OLD | TLB_NEW |
| 0x7160 | PGMTRAP_OLD | PGMTRAP_NEW |
| 0x7210 | SYSBP_OLD | SYSBP_NEW |

Lavorare con Interrupt e Device

Proviamo a modificare la funzione `tprint()` in versione "polling" in modo da utilizzare gli interrupt...

Riferimenti

Riferimento principale:

- ▶ μ ARM Informal Specifications
(<http://mellotanica.github.io/uARM/uarmdoc.pdf>)

Per i dettagli sui device:

- ▶ μ MPS Principles of Operation (<http://www.cs.unibo.it/~renzo/so/princOfOperations.pdf>)

Funzioni e strutture di supporto:

- ▶ `arch.h`, `uARMconst.h`, `uARMtypes.h`, `libuarm.h`

Domande?

Contattatemi tranquillamente via mailing list (SO) o per email:
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