

1. Tiny CPU
2. SRAM / DRAM
3. Cache
4. Vitrual Memory
5. AMBA

# 1. Tiny CPU

## Architecture Level Design [\[ edit \]](#)

### Background: Tiny CPU Examples [\[ edit \]](#)

- [\(Instruction Set\)](#)
- [\(Data Path\)](#)
- [\(Control Path\)](#)

- [CISC, RISC, VLIW, Dataflow \(1.pdf\)](#)
- [CPU, DSP, GPU, NPU \(2.pdf\)](#)
- [MCU, ASIP, TTA \(3.pdf\)](#)

[\[PDF\]](#) [ELE306 Fall 2001 Tiny CPU - University of Rhode Island](#)

[www.ele.uri.edu/Courses/e306/f01/Tinydoc.pdf](http://www.ele.uri.edu/Courses/e306/f01/Tinydoc.pdf) ▼

Feb 9, 2001 - ELE306 Fall 2001 Tiny CPU. 1. General Descriptions: The documentation herein describes a small CPU designed for the teaching purpose.

## System Level Design [\[ edit \]](#)

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- [Processors \(pdf\)](#)
- [Memories \(pdf\)](#)

### Cache Memory

[Readings \(pdf\)](#)

[Cache Note \(pdf\)](#)

See also [Content Addressable Memory \(pdf\)](#)

See also [Address Partition \(pdf\)](#)

See also [Cache Mapping \(pdf\)](#)

See also [Cache Memory Note \(pdf\)](#)

### Virtual Memory

[Readings \(pdf\)](#)

See also [Virtual Memory Note \(pdf\)](#)

### DRAM

[Readings \(pdf\)](#)

See also [RAM Structure \(pdf\)](#)

See also [RAM Timing \(pdf\)](#)

See also [FPGA RAM \(pdf\)](#)

See also [DRAM Memory Note \(pdf\)](#)

- [Interconnects](#)

### AMBA AHB & APB

[Readings \(pdf\)](#)

## 2. SRAM / DRAM

### DRAM

Readings (pdf)

See also RAM Structure (pdf)

See also RAM Timing (pdf)

See also FPGA RAM (pdf) → SRAM

See also DRAM Memory Note (pdf)



Jacob, ISCA2002

<http://www.ece.umd.edu/~blj/talks/DRAM-Tutorial-isca2002.pdf>



Culler, Berkely

<http://www-inst.eecs.berkeley.edu/~cs150/fa07/Lectures/lec14-mem-dram.pdf>

<https://inst.eecs.berkeley.edu/~cs150/fa04/Lecture/lec15.pdf>



IBM

<https://www.ece.cmu.edu/~ece548/localcpy/dramop.pdf>

<https://www.ece.cmu.edu/~ece548/localcpy/sramop.pdf>



SDRAM, Philips

<http://www.es.ele.tue.nl/premadona/files/akesson01.pdf>



Memory Technology Evolution, HP

<http://h10032.www1.hp.com/ctg/Manual/c00256987.pdf>



DDR Basics, NXP

[http://www.nxp.com/files/training\\_pdf/VFTF09\\_AN108.pdf](http://www.nxp.com/files/training_pdf/VFTF09_AN108.pdf)

## 3. Cache

### Cache Memory

Readings (pdf)

Cache Note (pdf)

See also Content Addressable Memory (pdf)

See also Address Partition (pdf)

See also Cache Mapping (pdf)

See also Cache Memory Note (pdf)

Memory System : Cache

<http://bwrcs.eecs.berkeley.edu/Classes/CS252/Notes/Lecture%2017.pdf>

• HW#6 (pdf)

## 4. Virtual Memory

### Virtual Memory

Readings (pdf)

See also Virtual Memory Note (pdf)

Koopman, CMU

<https://www.ece.cmu.edu/~ece548/handouts/05vmarch.pdf>

Harris, Computer Architecture

<http://booksite.elsevier.com/9780123944245/>

- HW#7 (pdf) - Pipeline Burst EDO DRAM

## 5. AMBA Bus

### AMBA AHB & APB

Readings (pdf)

#### ARM AHB-Lite 3.0

[http://www.eecs.umich.edu/courses/eecs373/readings/ARM\\_IHI0033A\\_AMBA\\_AHB-Lite\\_SPE\\_C.pdf](http://www.eecs.umich.edu/courses/eecs373/readings/ARM_IHI0033A_AMBA_AHB-Lite_SPE_C.pdf)

#### ARM APB 3.0

[https://web.eecs.umich.edu/~prabal/teaching/eecs373-f10/readings/ARM\\_AMBA3\\_APB.pdf](https://web.eecs.umich.edu/~prabal/teaching/eecs373-f10/readings/ARM_AMBA3_APB.pdf)