# Computer Architecture and Organization

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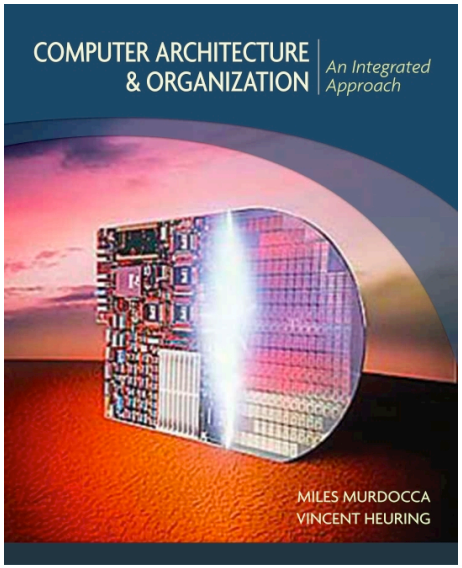



# Appendix B – Using ARCTools

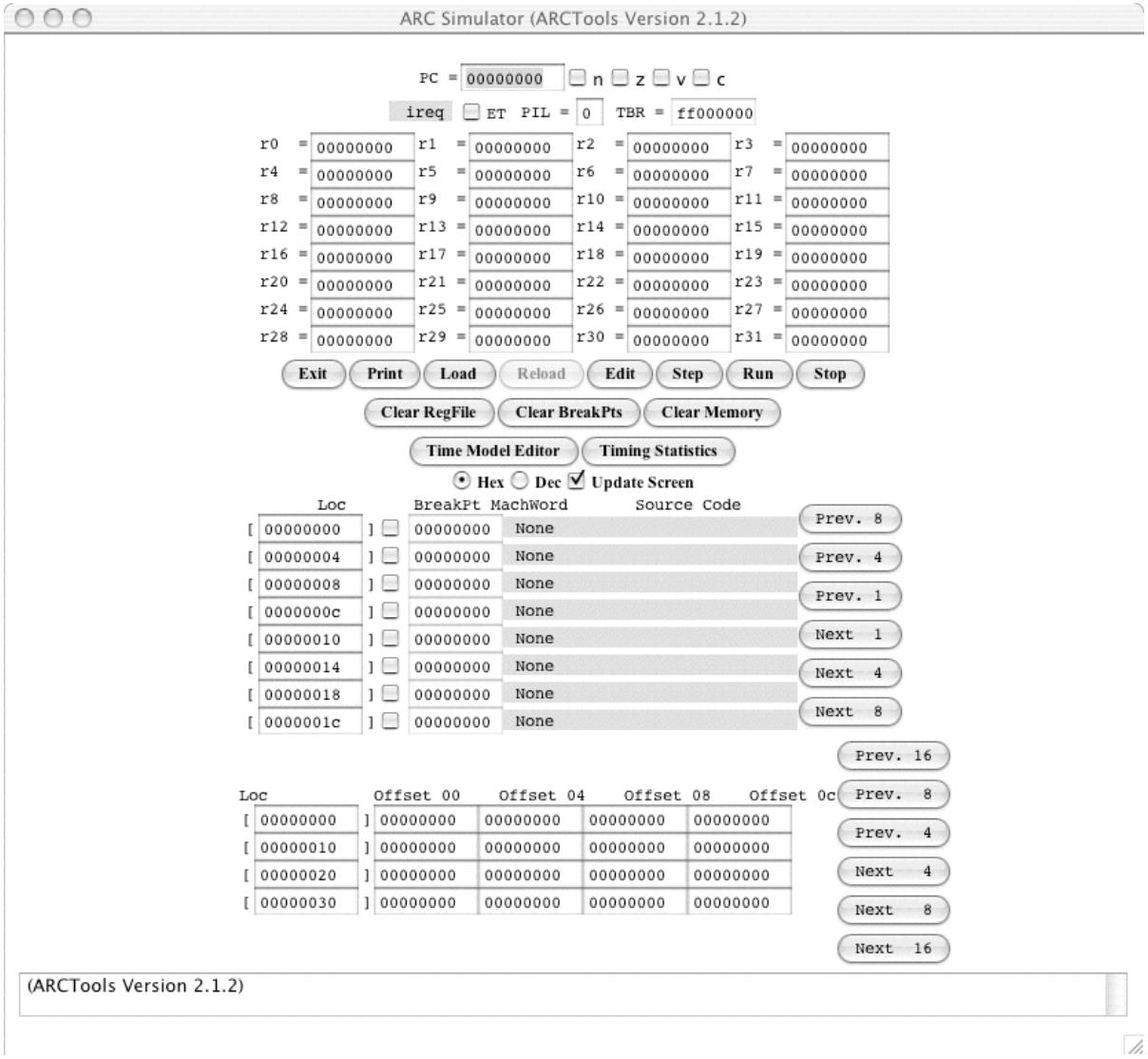
# Chapter Contents

# Using ARCTools

The ARCTools toolset includes the following features:

- An integrated assembler and simulator for the ARC ISA.
- Extensions to the ISA described in Chapter 4 with several additional actual and synthetic instructions.
- A trap mechanism.
- A simple macroprocessing facility.
- Ability to specify instruction timings.
- A multi-level cache memory simulator.
- A number of example programs showing the features of the toolset.

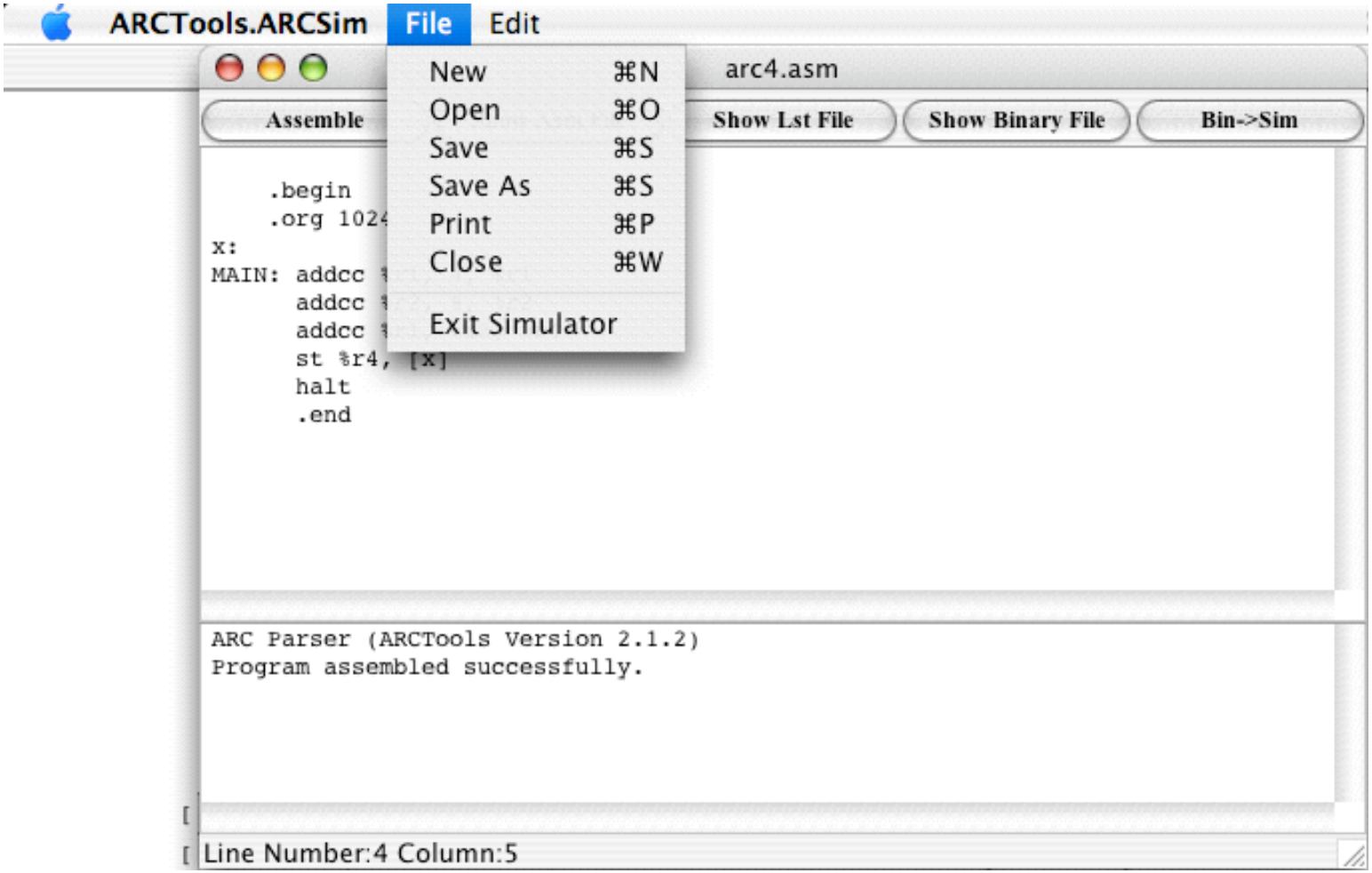
# The ARCTools Simulator Window



# The ARCTools Edit Window

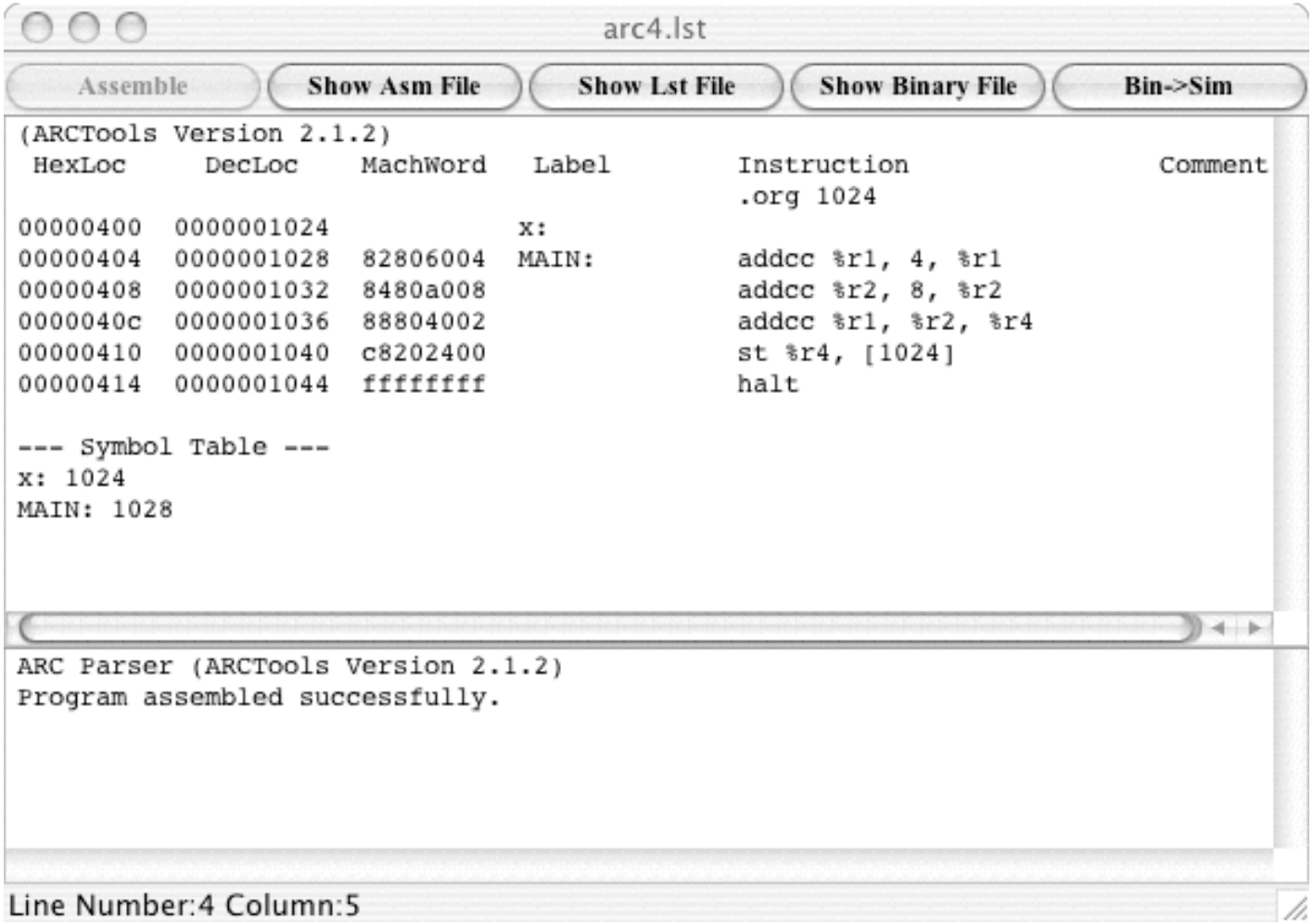
# The ARCTools Edit Window

- The Edit window with an asm file and the file dialog



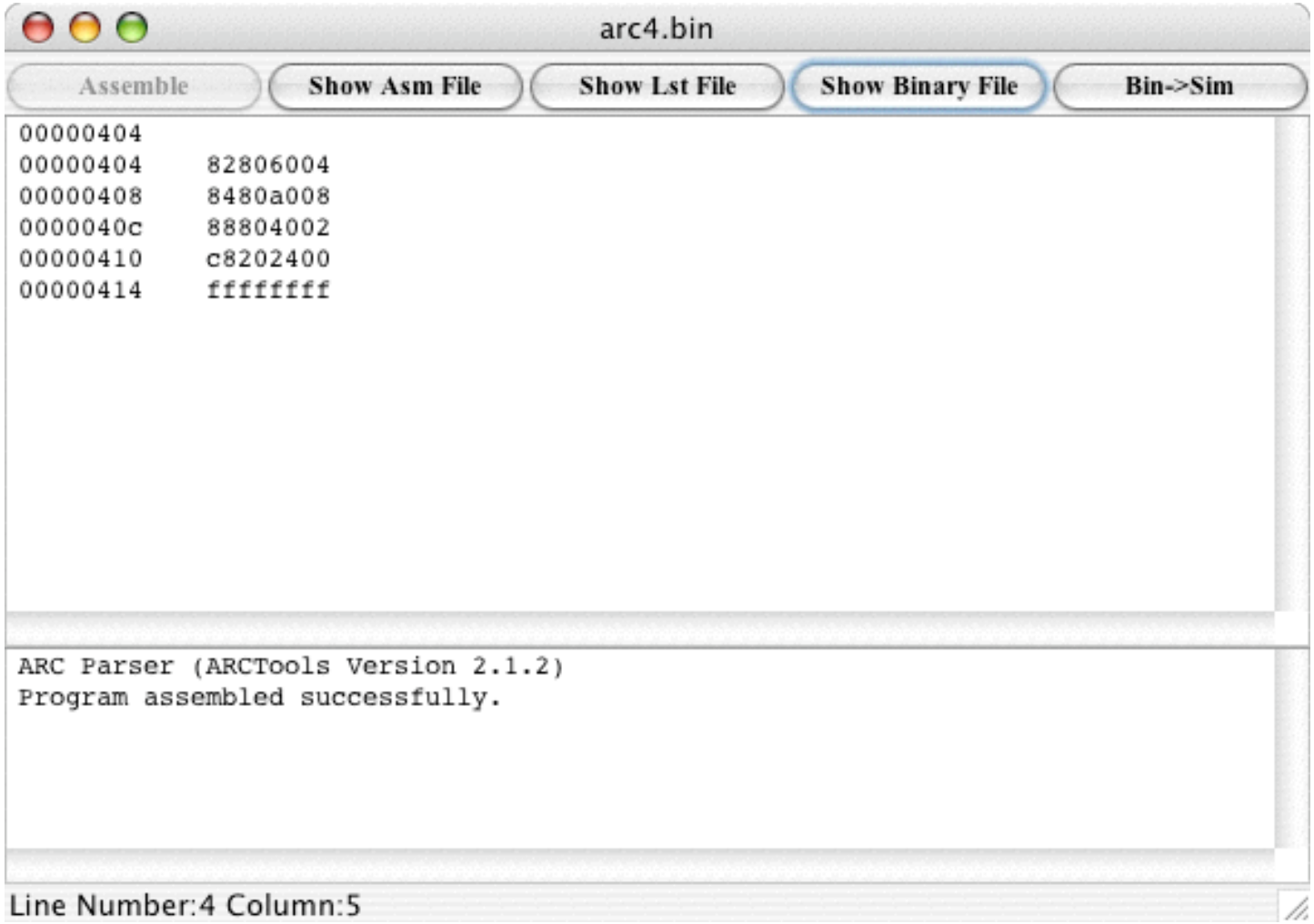
# Assembly

- The arc4 program after assembly, showing arc4.lst, the listing file.



# Binary File

- The arc4 bin file, displayed after pressing the Show Binary File button.

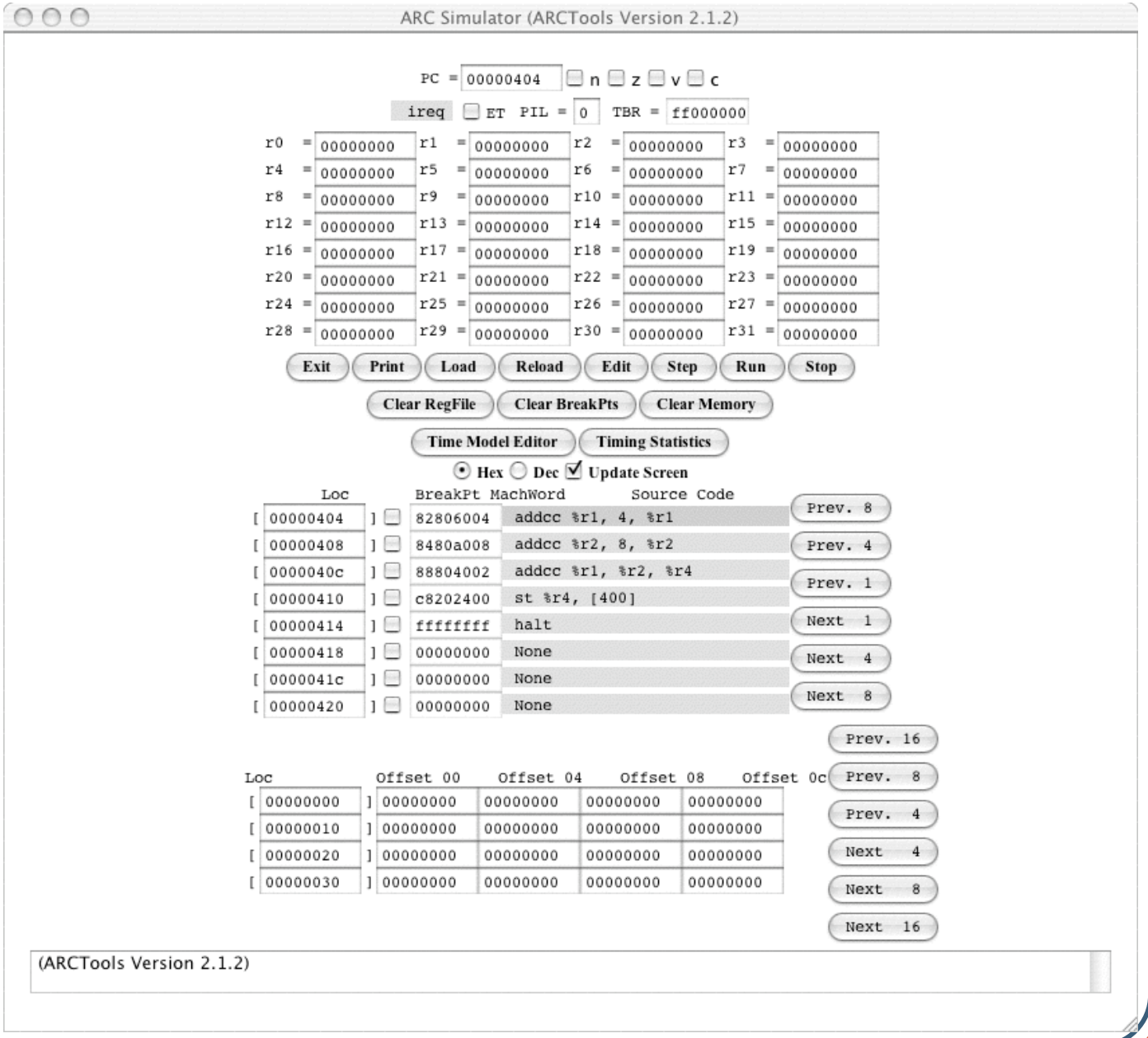


# Setting up ARCTools

- Contents of the ARCTools directory after unzipping.

# Simulation

- The ARCTools simulator window after pressing Bin -> Sim.



# Instructions Recognized by ARCTools

| | | | | |
|---|---|---|---|---|
| add | addcc | and | andcc | andn |
| andncc | ba | bcc | bcs | be |
| bg | bge | bgu | bl | ble |
| bleu | bn | bne | bneg | bpos |
| bvc | bvs | call | jmpl | ld |
| ldsb | ldsh | ldub | lduh | or |
| orcc | orn | orncc | rd | rett |
| sethi | sll | sra | srl | st |
| stb | sth | sub | subcc | ta |
| wr | xnor | xnorcc | xor | xorcc |

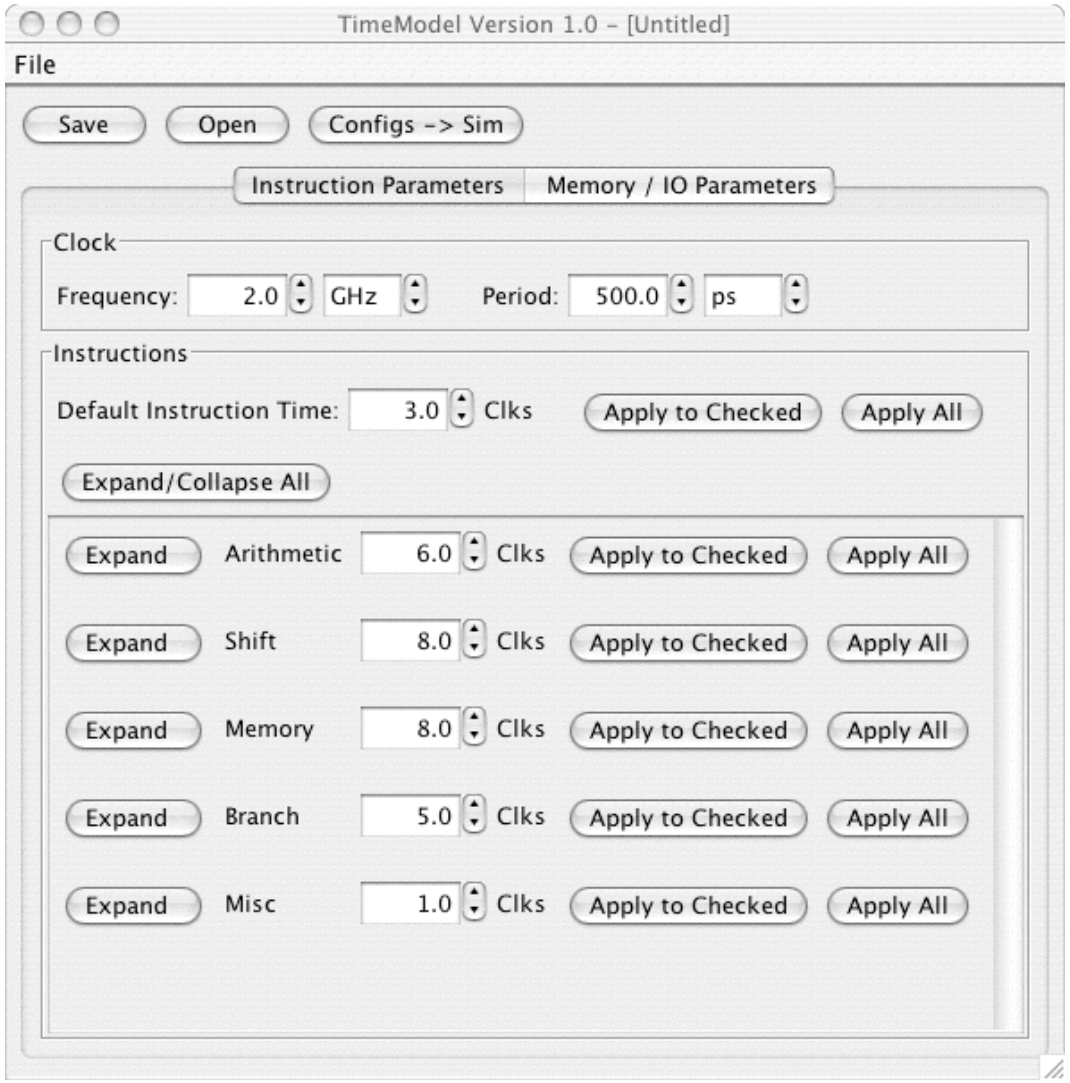
# Synthetic Instructions Recognized by ARCTools

| Synthetic Instruction | Instruction Generated | Comment |
|---|---|---|
| `not rs1, rd` | `xnor rs1, %r0, rd` | 1's complement |
| `neg rs2, rd` | `sub %r0, rs2, rd` | 2's complement |
| `inc rd` | `add rd, 1, rd` | increment by 1 |
| `dec rd` | `sub rd, 1, rd` | decrement by 1 |
| `clr rd` | `and rd, %r0, rd` | clear a register |
| `cmp rs1, reg_or_imm` | `subcc rs1, reg_or_imm, %r0` | compare, set cc's |
| `tst rs2` | `orcc %r0, rs2, %r0` | test |
| `mov reg_or_imm, rd` | `or %r0, reg_or_imm, rd` | move a value |

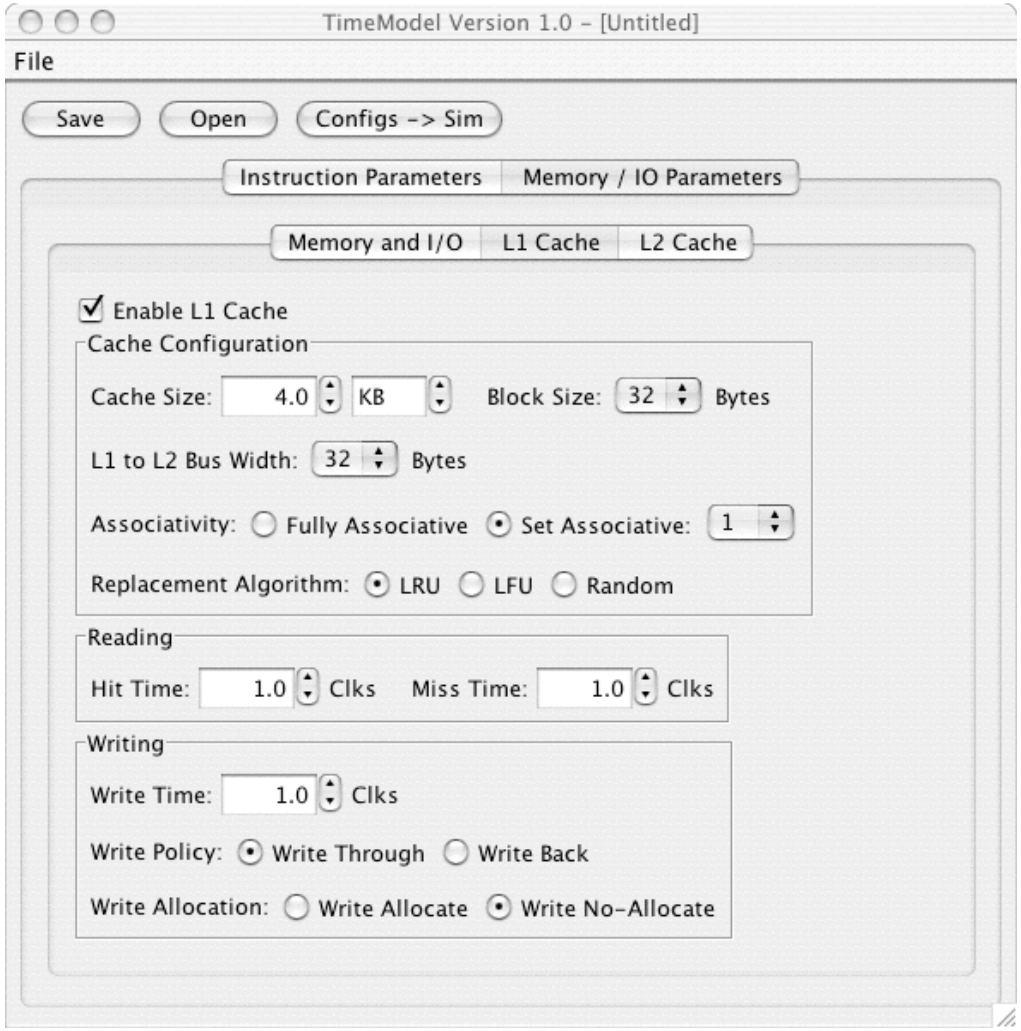
# Pseudo-Ops Recognized by ARCTools

| Pseudo-operations | Meaning |
|---|---|
| `.equ value` | Equate a symbol to a `value` |
| `.begin` | begin assembly |
| `.end` | end of assembly language text |
| `.org value` | move location counter to value |
| `.dwb value` | reserve space for `value` words |
| `.macro Name [,params]*` | begin definition of macro `Name`, with an optional, comma-separated parameter list |
| `.if <cond>` | assemble if <cond> is true (only used in macros) |
| `.endif` | end of `.if` construct (only used in macros) |
| `.endmacro` | end of macro definition |

# Instruction Parameters Window



# Adjustable Parameters in the L1 Cache Window



# The Timing Statistics Window