Computer Architecture Toolkit

Article 2: simpleADL Software Installation

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1. Introduction

The software that accompanies these articles assumes a few things:

- You're using a Mac, and you have a sufficiently up-to-date XCode (and its command line tools) installed on that Mac

- You know the basics of using XCode to build 'command-line tools'

- You're comfortable with using the Terminal (no great skill is required)

- A particular folder hierarchy.

The software is provided as a zip'd file.

- Download it, and then double-click it. It should decompress into a folder hierarchy as described below.

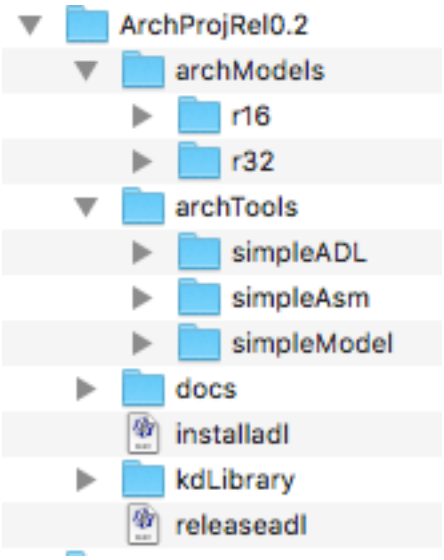
- Move it to where you want.

- Rename the upper level folder if you like (from *ArchProjRelx.x* to whatever you like) (Do NOT change the innards of this folder, though)

WARNING: there must be no spaces in the names of any folder in the folder hierarchy containing *ArchProjRelx.x* and if you change the name, that name must also have no spaces.

1.1. Folder Hierarchy

The folder hierarchy looks like this, where the outer folder may be called something else (and you can change its name):

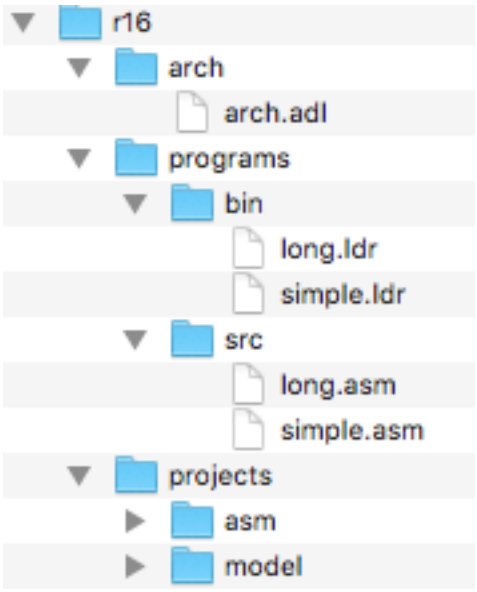


That is, there's a top folder (*ArchProjRel0.2*) which is going to hold all this stuff. It contains four folders, *archModels*, *archTools*, *docs* and *kdLibrary*, along with a couple of files *installadl* and *releaseadl*

- *archModels* contains a folder for each architecture - here, we have just two (r16 and r32). Each architecture will contain its own architecture spec, source code and assembler and executable model. More on this later.
- *archTools* contains a folder for each tool we have - here, *simpleADL*, *simpleAsm* and *simpleModel*. *simpleADL* is the adl compiler. The other two are the canonical assembler and executable model. Each folder contains also a *makefile* and a folder which contains an XCode project for the tool. You can use the XCode project to play with the source code, if you wish.

- *kdlibrary* contains a number of projects which provide common functionality - a queue package, a tokeniser package, a symbol table management package, and a utilities package. These are held in their own XCode projects; when built, these perform simplistic testing of some elements of the packages. The .c and .h files in these projects are incorporated *by being copied* into the simpleADL project, into the simpleAsm, the simpleModel and into the generated projects. This lets you easily see the source of the packages in any project, and it also means that if you make changes to the source of any package, it will NOT be seen by all projects. Be careful!

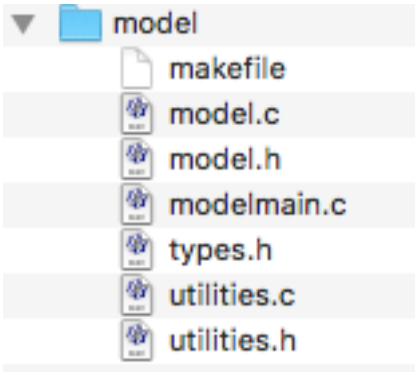
An architecture, such as *r16*, has an internal structure:



Each architecture contains three folders.

- One, *arch*, contains a file *arch.adl* which specifies the architecture.
- *programs* contains a pair of folders, *bin* and *src*; *src* contains the (assembler) source of programs of interest, and *bin* contains their loadable representations.
- The architecture requires an executable model and an assembler; these are collections of source, along with a makefile held in *model* and *asm* respectively inside the *projects* folder.

The *asm* and *model* folders also have a structure. Here's that for *model:*



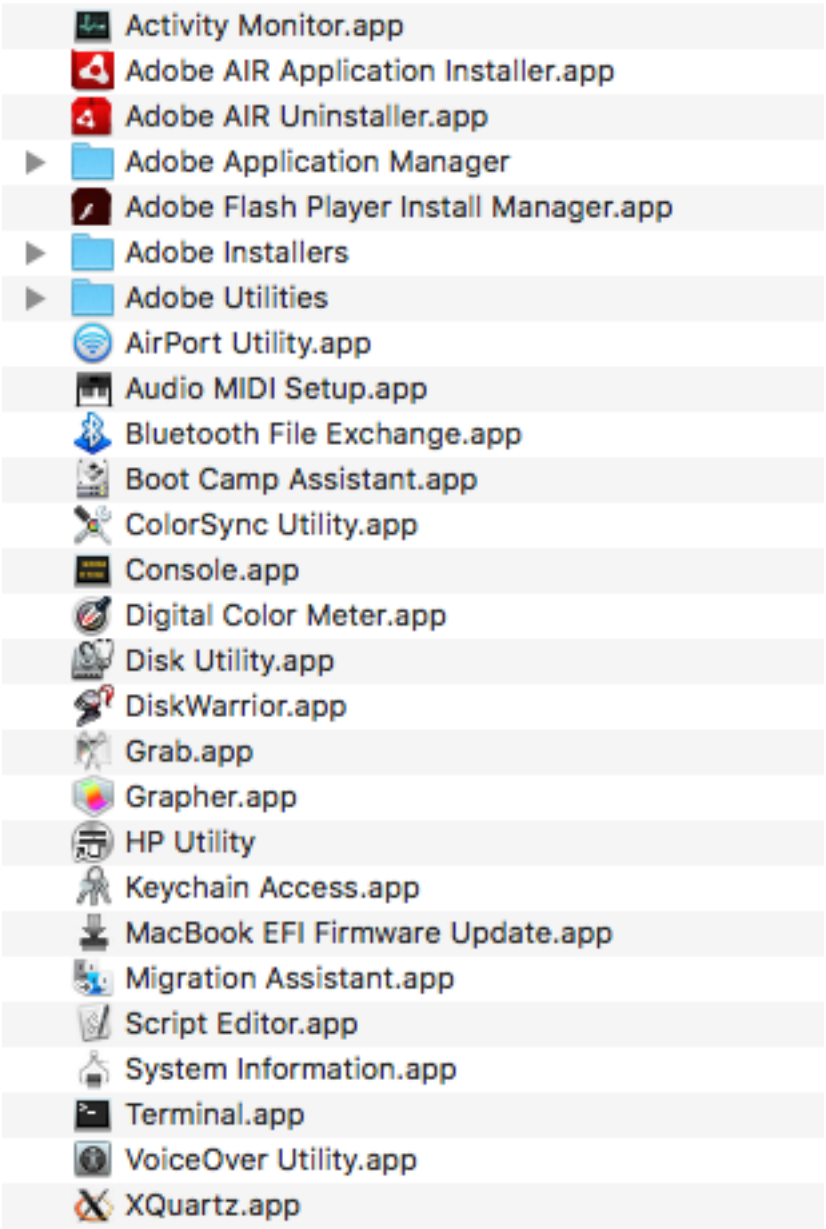
The files *model.c* and *model.h* are created by simpleADL.. *makefile* contains instructions to compile the necessary source files.

2. Install simpleADL

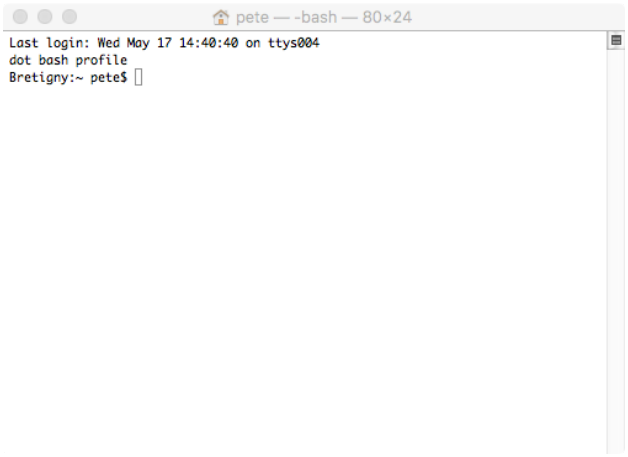
Installing the simpleADL software is pretty straightforward. All you need to do is to open a Terminal window, *cd* to the archProjRel folder you've just unzipped, and type *./installadl*.

If you've not played with the terminal before, it's a program which lets you issue commands to macOS, just like in the good old days of computing before graphical user interfaces.

You will find a folder called *Utilities* inside your *Applications* folder. Open up Utilities and you'll see something like this:



Double-click on *Terminal.app* to run it. You'll get a boring little window something like this:



Click in the window, and type *cd*.

Then open a Finder window and navigate to a view which shows the *ArchProjRel* folder. Drag that folder to the Terminal window, directly after the *cd*. The act of dragging puts the complete path to that folder onto the line of text, thus:

```
Bretigny:~ pete$ cd /Volumes/OxfordRoad/Users/pete/ArchProjRel-0.2
```

Now hit return.

This tells the terminal that you want to operate within the *ArchProjRel* folder.

Type *pwd* and then return. This tells the terminal to **p**rint the current **w**orking **d**irectory. On my machine, which is called Bretigny,, we get this

```
Bretigny:~ pete$ cd /Volumes/OxfordRoad/Users/pete/ArchProjRel-0.2
Bretigny:ArchProjRel-0.2 pete$ pwd
/Volumes/OxfordRoad/Users/pete/ArchProjRel-0.2
```

Now type *./installadl* and hit return.

A *shell script* called *installadl* which is inside the ArchProjRel folder will be executed. This tidies up files and copies files into the right places, builds simpleADL and all the other stuff. It'll ask for your password during the installation process, but other than that the whole thing gets done in a few seconds.

The script does install programs in a directory in your machine. You may want to open up *installadl* in a text editor to satisfy yourself it's not doing anything naughty.

You should see something like this happen:

```
Bretigny:ArchProjRel-0.2 pete$ ./installadl
installadl 0.1v0

setting up tools:
copying files for simpleADL...

Making simpleADL...
rm sADL simpleADL.o utilities.o TokUtilities.o TokName.o Tokens.o symbol.o queues.o generateAsm.o
generateModel.o
clang    -c -o simpleADL.o simpleADL.c
clang    -c -o utilities.o utilities.c
clang    -c -o TokUtilities.o TokUtilities.c
clang    -c -o TokName.o TokName.c
clang    -c -o Tokens.o Tokens.c
clang    -c -o symbol.o symbol.c
clang    -c -o queues.o queues.c
clang    -c -o generateAsm.o generateAsm.c
clang    -c -o generateModel.o generateModel.c
echo "making simpleADL as sADL"
```

```
making simpleADL as sADL
clang -o sADL simpleADL.o utilities.o TokUtilities.o TokName.o Tokens.o symbol.o queues.o generateAsm.o
generateModel.o
sudo cp sADL /usr/local/bin
Password:
```

Note that the terminal is asking for your password.

It needs this so the script can copy the simpleADL program into a folder (/usr/local/bin) so it'll be easily accessible from the terminal. The password the terminal wants is the one you use when you start up your Mac. Type it in and hit return. The terminal will continue working. When it's done, you'll have text like this in the terminal:

```
Bretigny:ArchProjRel-0.2 pete$ ./installadl
installadl 0.1v0

setting up tools:
copying files for simpleADL...

Making simpleADL...
rm sADL simpleADL.o utilities.o TokUtilities.o TokName.o Tokens.o symbol.o queues.o generateAsm.o
generateModel.o
clang    -c -o simpleADL.o simpleADL.c
clang    -c -o utilities.o utilities.c
clang    -c -o TokUtilities.o TokUtilities.c
clang    -c -o TokName.o TokName.c
clang    -c -o Tokens.o Tokens.c
clang    -c -o symbol.o symbol.c
clang    -c -o queues.o queues.c
clang    -c -o generateAsm.o generateAsm.c
clang    -c -o generateModel.o generateModel.c
echo "making simpleADL as sADL"
making simpleADL as sADL
clang -o sADL simpleADL.o utilities.o TokUtilities.o TokName.o Tokens.o symbol.o queues.o generateAsm.o
generateModel.o
sudo cp sADL /usr/local/bin
Password:

Copying simpleADL into /usr/local/bin/.. as sADL
copying files  for simpleAsm...

making simpleAsm...
rm sAsm asmmain.o utilities.o TokUtilities.o TokName.o Tokens.o symbol.o queues.o asm.o
clang    -c -o asmmain.o asmmain.c
clang    -c -o utilities.o utilities.c
clang    -c -o TokUtilities.o TokUtilities.c
clang    -c -o TokName.o TokName.c
clang    -c -o Tokens.o Tokens.c
clang    -c -o symbol.o symbol.c
clang    -c -o queues.o queues.c
clang    -c -o asm.o asm.c
clang -o sAsm asmmain.o utilities.o TokUtilities.o TokName.o Tokens.o symbol.o queues.o asm.o

Copying simpleAsm into /usr/local/bin/.. as sAsm
copying files  for simpleModel...

Making simpleModel...
rm sModel modelmain.o model.o utilities.o
clang    -c -o modelmain.o modelmain.c
clang    -c -o model.o model.c
clang    -c -o utilities.o utilities.c
clang -o sModel modelmain.o model.o utilities.o
sudo cp sModel /usr/local/bin

Copying simpleModel into /usr/local/bin/.. as sModel
```

```
listing architectures:

r16...
copying files for asm...
copying files for model...

Running simpleADL to create the architecture's asm and model source and header files...


Done. Took 3 milliseconds

Making the assembler and copying to /usr/local/bin
rm -f asmr16 *.o
clang -I.   -c -o asmmain.o asmmain.c
clang -I.   -c -o asm.o asm.c
clang -I.   -c -o utilities.o utilities.c
clang -I.   -c -o TokUtilities.o TokUtilities.c
clang -I.   -c -o TokName.o TokName.c
clang -I.   -c -o Tokens.o Tokens.c
clang -I.   -c -o symbol.o symbol.c
clang -I.   -c -o queues.o queues.c
clang -O2 -o asmr16 asmmain.o asm.o utilities.o TokUtilities.o TokName.o Tokens.o symbol.o queues.o -I.
sudo cp asmr16 /usr/local/bin

Making the model and copying to /usr/local/bin
rm -f modelr16 modelmain.o model.o utilities.o
clang    -c -o modelmain.o modelmain.c
clang    -c -o model.o model.c
clang    -c -o utilities.o utilities.c
clang -O2 -o modelr16 modelmain.o model.o utilities.o
sudo cp modelr16 /usr/local/bin

r32...
copying files for asm...
copying files for model...

Running simpleADL to create the architecture's asm and model source and header files...


Done. Took 2 milliseconds

Making the assembler and copying to /usr/local/bin
rm -f asmr32 *.o
clang -I.   -c -o asmmain.o asmmain.c
clang -I.   -c -o asm.o asm.c
clang -I.   -c -o utilities.o utilities.c
clang -I.   -c -o TokUtilities.o TokUtilities.c
clang -I.   -c -o TokName.o TokName.c
clang -I.   -c -o Tokens.o Tokens.c
clang -I.   -c -o symbol.o symbol.c
clang -I.   -c -o queues.o queues.c
clang -O2 -o asmr32 asmmain.o asm.o utilities.o TokUtilities.o TokName.o Tokens.o symbol.o queues.o -I.
sudo cp asmr32 /usr/local/bin

Making the model and copying to /usr/local/bin
rm -f modelr32 modelmain.o model.o utilities.o
clang    -c -o modelmain.o modelmain.c
clang    -c -o model.o model.c
clang    -c -o utilities.o utilities.c
clang -O2 -o modelr32 modelmain.o model.o utilities.o
sudo cp modelr32 /usr/local/bin

All done.
```

```
Bretigny:ArchProjRel-0.2 pete$
```

You should read the output to be sure that there are no complaints. (Complaints like this:

```
rm: sADL: No such file or directory
rm: simpleADL.o: No such file or directory
rm: utilities.o: No such file or directory
rm: TokUtilities.o: No such file or directory
rm: TokName.o: No such file or directory
rm: Tokens.o: No such file or directory
rm: symbol.o: No such file or directory
rm: queues.o: No such file or directory
rm: generateAsm.o: No such file or directory
rm: generateModel.o: No such file or directory
make: *** [clean] Error 1
```

Are not a problem. The remove-a-file command *rm* is moaning that it can't remove a file because it doesn't exist)

When this is done, you can run any of the tools, and the assemblers and models for the architectures, from a terminal window. The assembler for an architecture X is called *asmX*; its executable model is *modelX*. All the tools are placed inside the /usr/local/bin directory, which means you have access to them by typing their names. The programs installed are

- sADL - the simpleADL compiler
- sAsm - the archetypal assembler
- sModel - the archetypal executable model
- asmr16 - the assembler for the r16 architecture
- modelr16 - the executable model for the r16 architecture
- asmr32 - the assembler for the r32 architecture
- modelr32 - the executable model for the r32 architecture

3. Create a new architecture

To create a new architecture, the simplest thing to do is to

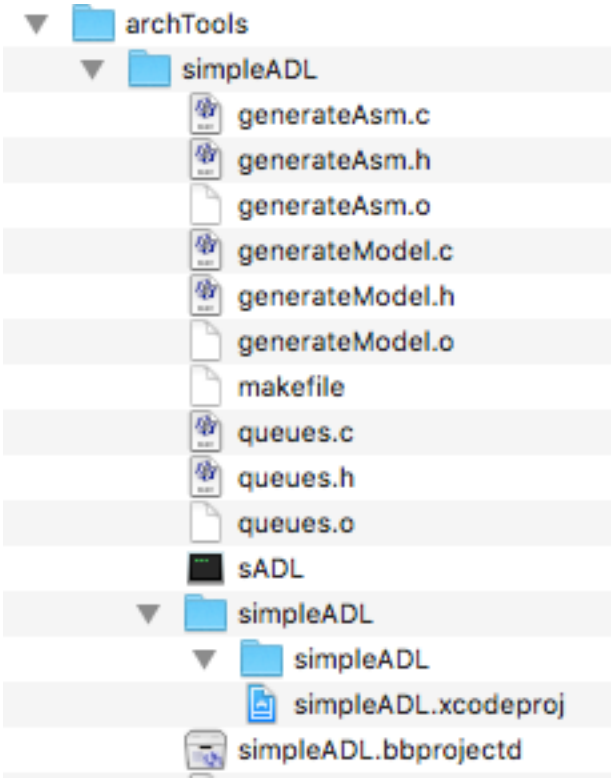
- Duplicate the *r16* folder inside *ArchProjRel,* creating the *r16 copy* folder
- Rename the *r16 copy* folder to the name you want to give the new architecture, say *my_arch.*
- Dive into the *model* and *asm* folders inside the projects folder, and delete the *Derived Data* folder from each if present.
- Edit *arch.adl* in the *arch* folder to reflect the architecture you want
- Run the simpleADL tool, pointing it at your new architecture (by providing the path to the *my_arch* folder). Do this in a Terminal window: simply type *sADL* and then drag the my_arch folder into the Terminal window and hit return. Correct the inevitable errors. When eventually executed correctly, simpleADL will write some new files into NewArch's *model* and *asm* folders.
- When it all seems to work, cd back to the ArchProjRel folder and run ./installadl as you did initially. This will populate your architecture with all the files you need and build the assembler and executable model for it, and install the programs. [It will also do the same for *all* the architectures, but it's quick enough that this does no great harm].
- Modify the example programs that got copied into your asm folder to match your architecture - or write new ones.

- In a Terminal window, type *asmmy_arch* (or whatever) *<name of an asm file>* to run your generated assembler on the specified file, like *asmmy_arch simple.asm*. Correct the ineveitable errors, and then execute the assembled file by typing *modelmy_arch simple.ldr*.

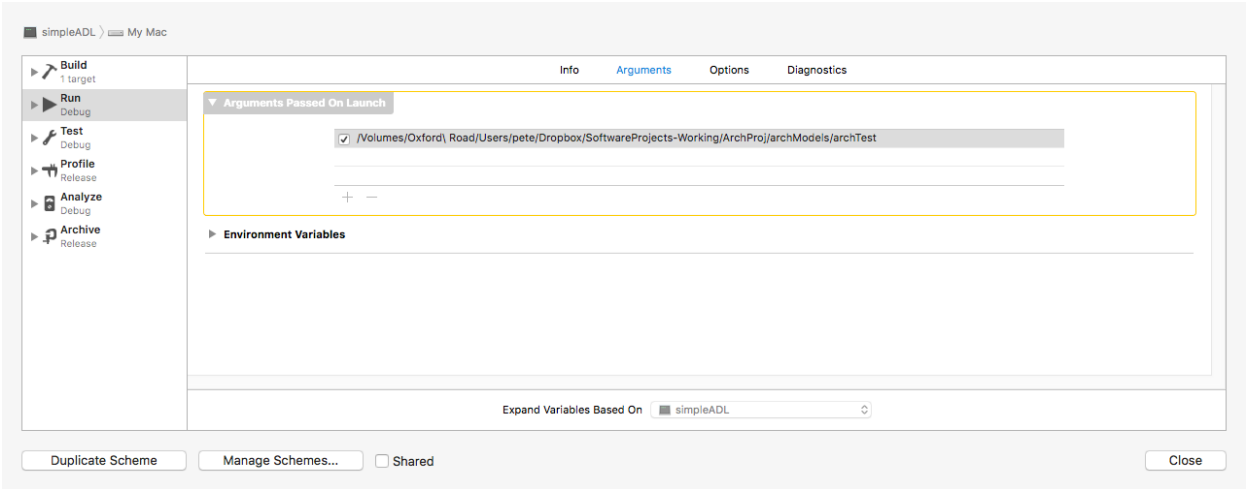
Rinse and repeat.

3.1. Running simpleADL

You can run simpleADL inside XCode. Just double-click on the *simpleADL.xcodeproject* file inside the *simpleADL* folder inside the *simpleADL* folder:



Proceed as usual. You'll need to provide simpleADL with arguments, which you do using the Product:Scheme:Edit Scheme menu and choosing Edit Scheme. The provide the needed argument(s)



However, the simplest way to proceed is to use a terminal window.

If you type sADL into a terminal window, it will respond with usage instructions:

```
Bretigny:~ pete$ sADL
```

```
 simpleADL [simpleADL 1.0v25]
         using utilities kiva utility functions 1.0v4 May 2017
         using tokeniser package simpleTokeniser 1.0v11 January 2017
         using queue package simpleQueues 1.0v1 [May 8 2017]
         using symbol table symbol table management 1.0v1

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use

         usage:
        sADL <options> <path to architecture folder>
        options:
                 -u -> report release info
                 -p -> report parse progress
                 -a -> report assembler generation
                 -m -> report model generation
                 -s -> report statistics

Done.
```

To generate assembler and executable model for an architecture, type sADL into a terminal window and drag the architecture's folder to it, then hit return.

If we do this for the r32 architecture, we get something like this:

```
Bretigny:~ pete$ sADL /Volumes/OxfordRoad/Users/pete/ArchProjRel-0.2/archModels/r32


Done. Took 8 milliseconds
Bretigny:~ pete$
```

You can select any or all of the options by typing them on the commandl ine - it doesn't matter what order they're in. You have to specify each one separately. As an example:

```
Bretigny:ArchProjRel-0.2 pete$ sADL /Volumes/OxfordRoad/Users/pete/ArchProjRel-0.2/archModels/r32 -u -s

        -u report release info.
        -s report statistics.
 simpleADL [simpleADL 1.0v25]
         using utilities kiva utility functions 1.0v4 May 2017
         using tokeniser package simpleTokeniser 1.0v11 January 2017
         using queue package simpleQueues 1.0v1 [May 8 2017]
         using symbol table symbol table management 1.0v1

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use


Number of instructions declared = 23
Number of fields declared = 9
Maximum number of fields per instruction = 5
Symbol Table 'architecture' stats:
        Number of symbol queues:    29
        Total number of symbols:    35
        Average symbols per queue:  1
                q0: 0 syms [0.000000x the avg]
                q1: 1 syms [1.000000x the avg]
                q2: 0 syms [0.000000x the avg]
                q3: 2 syms [2.000000x the avg]
                q4: 2 syms [2.000000x the avg]
                q5: 1 syms [1.000000x the avg]
                q6: 1 syms [1.000000x the avg]
                q7: 1 syms [1.000000x the avg]
                q8: 1 syms [1.000000x the avg]
                q9: 1 syms [1.000000x the avg]
                q10: 3 syms [3.000000x the avg]
```

```
                q11: 2 syms [2.000000x the avg]
                q12: 1 syms [1.000000x the avg]
                q13: 0 syms [0.000000x the avg]
                q14: 2 syms [2.000000x the avg]
                q15: 0 syms [0.000000x the avg]
                q16: 0 syms [0.000000x the avg]
                q17: 3 syms [3.000000x the avg]
                q18: 1 syms [1.000000x the avg]
                q19: 2 syms [2.000000x the avg]
                q20: 2 syms [2.000000x the avg]
                q21: 0 syms [0.000000x the avg]
                q22: 2 syms [2.000000x the avg]
                q23: 0 syms [0.000000x the avg]
                q24: 2 syms [2.000000x the avg]
                q25: 0 syms [0.000000x the avg]
                q26: 3 syms [3.000000x the avg]
                q27: 1 syms [1.000000x the avg]
                q28: 1 syms [1.000000x the avg]

Done. Took 3 milliseconds
Bretigny:ArchProjRel-0.2 pete$
```

You can be 'in' any folder to run the tools. When you run sADL, the assembler and model files it creates include information on where the relevant architecture folders are. So you can be anywhere and run *asmr32*, for example - it will open the file you specify from the /src folder in the r32 folder hierarchy. This is good, but limiting for real software development. But no-one develops in assembler, and simpleADL is only intended as an educational and proof of concept toolkit.

You can get usage information by running the tools without any arguments. So, for the r32 architecture, we get

```
Bretigny:ArchProjRel-0.2 pete$ asmr32
asmr32 0.1v17
        using tokeniser simpleTokeniser 1.0v11 January 2017
        using queue package simpleQueues 1.0v1 [May 8 2017]
        using symbol table symbol table management 1.0v1

usage:
        -r      -> report all activities
        -s      -> report symbol table statistics
Bretigny:ArchProjRel-0.2 pete$ modelr32

architecture simulator 0.1v6 for 'r32_model 0.1v0'
default bin path '/Volumes/OxfordRoad/Users/pete/ArchProjRel-0.2/archModels/r32'
         usage:
         -l -> report load progress
         -r -> report execution (shortform)
         -t -> trace execution (longform)
         -s -> single-step execution.
         <name of file to load> in /Volumes/OxfordRoad/Users/pete/ArchProjRel-0.2/archModels/r32

Done.
Bretigny:ArchProjRel-0.2 pete$
```

3.2. This Release

The simpleADL version 0.1v28 improves capabilities compared to previous releases. In particular, it allows the writing of *data* in a program, not just instructions, and the provision of code and data segments. Character constants are also supported, along with named cosntants

This requires minor changes in syntax.

Here's what a data-using program looks like:

```
// example r32 assembler program

/*
versions:
0.1v0
        - initial version with data and absolute fixups and code and data segments
0.1v2
        - now with character constants and with named constants
*/

title label
memory 0x1000
start 0x10

const ubiquitous = 1034;          // named constant declarations
const pussycat = 37;

codeseg

[main]
        // some named constants
        cpyc r5, ubiquitous;
        cpyc r5, pussycat;

        cpyc r1, 0;                     // allows for 12 bit constant
        cpyc r2, 1000;          // allows for 12 bit constant
[loop]
        addc r1, r1, 1;
        sub r3, r2, r1;
        bne r3, loop;
[finis]
        // some named constants
        cpyc r5, ubiquitous;
        cpyc r5, pussycat;
        // some character constants
        cpyc r5, 'a';
        cpyc r5, 'A';
        cpyc r5, '5';
        cpyc r5, '\n';
        cpyc r5, '\0';
        cpyc r5, @datalabel;    // point at the data with r5
        //cpyc r5, 0x7c;
        cpyc r1, 0;
        cpyc r2, 32;
        outcharc '\n';
        outhex r5;                              // output data start address
        outcharc '\n';
[counting]
        ld8 r3, r5, r1;                 // read the byte in mem
        outhex r1;                              // output the address
        outcharc '\t';                  // space
        outhex r3;                              // the value
        outcharc '\n';                  // newline
        addc r1, r1, 1;
        sub r4, r2, r1;
        bne r4, counting;

        halt;

dataseg
[otherlabel]
[datalabel]

        d8 1 2 3 4 5 6 7 8 9 10;
        d16 0x1111 0x222 0x3333 0x4444 0x5555 0x6666;
```

```
        d32 0x12345678 0x4567890 0x98765 0x77 0x1235;

    [lastlabel]
```

Changes are shown in bolded text; in summary:

- Programs must now declare *codeseg* before any instructions or data
- Programs must declare *dataseg* before any data
- Named constants must appear before any *codeseg* or *dataseg*
- Character constants are now supported
- Data is declared as a sequence of 1, 2 or 4-byte values by the keywords *d8*, *d16* and *d32*. Values may be integers or hex values. The values are *space-separated* and terminated by a semicolon. Data items cannot be larger than the instruction size. The assembler may not check for this.
- The *absolute address* of a label may be captured into any instruction which loads a constant by using the syntax (e.g.) *cpyc* **@*labelname*** No provision is made for labels whose addresses are larger in size than permissible constants.
- There is a predefined constant, *memTop*, which holds the size of the memory system in bytes, as specified by the assembler file.

The assembler has more options than previously. In particular, it can insert labels into the .ldr file, commented out (so you can see better where things are). With this option, the .ldr file for the above is

```
title label.ldr
arch r32
start 0x10
memory 0x1000
codeseg 0x10 0x84
dataseg 0xa4 0xd0
code
// [main]                       at 0x10
        0x40 0xa3 0x00 0xa4
        0x02 0x53 0x00 0xa4
        0x00 0x03 0x00 0x24
        0x3e 0x83 0x00 0x44
// [loop]                       at 0x20
        0x00 0x10 0x84 0x24
        0x08 0x00 0x88 0x62
        0xff 0x8a 0x00 0x64
// [finis]                      at 0x2c
        0x40 0xa3 0x00 0xa4
        0x02 0x53 0x00 0xa4
        0x06 0x13 0x00 0xa4
        0x04 0x13 0x00 0xa4
        0x03 0x53 0x00 0xa4
        0x00 0xa3 0x00 0xa4
        0x00 0x03 0x00 0xa4
        0x0a 0x43 0x00 0xa4
        0x00 0x03 0x00 0x24
        0x02 0x03 0x00 0x44
        0x00 0xae 0x80 0x04
        0x00 0x80 0x40 0xa2
        0x00 0xae 0x80 0x04
// [counting]                   at 0x60
        0x08 0x0f 0x14 0x62
        0x00 0x80 0x40 0x22
        0x00 0x9e 0x80 0x04
        0x00 0x80 0x40 0x62
        0x00 0xae 0x80 0x04
        0x00 0x10 0x84 0x24
        0x08 0x00 0x88 0x82
```

```
        0xfe 0x4a 0x00 0x84
        0x00 0x00 0x00 0x02
end

data                    // start of data segment at 0xa4

// [otherlabel]                 at 0xa4
// [datalabel]                  at 0xa4
        0x01 0x02 0x03 0x04
        0x05 0x06 0x07 0x08
        0x09 0x0a 0x00 0x00
        0x11 0x11 0x02 0x22
        0x33 0x33 0x44 0x44
        0x55 0x55 0x66 0x66
        0x12 0x34 0x56 0x78
        0x04 0x56 0x78 0x90
        0x00 0x09 0x87 0x65
        0x00 0x00 0x00 0x77
        0x00 0x00 0x12 0x35
// [lastlabel]                  at 0xd0
end
stop
```

And executing it provides the result:

```
Bretigny:ArchProjDev pete$ modelr32 label.ldr

architecture simulator 0.1v8 for 'r32_model 0.1v0'
default bin path '/Volumes/OxfordRoad/Users/pete/ArchProjDev/archModels/r32'
Going to load and execute file '/Volumes/OxfordRoad/Users/pete/ArchProjDev/archModels/r32/programs/bin/
label.ldr'
        loading software..loaded; took 1031 microsecs

Run the software ..
0xa4
0x0     0x1
0x1     0x2
0x2     0x3
0x3     0x4
0x4     0x5
0x5     0x6
0x6     0x7
0x7     0x8
0x8     0x9
0x9     0xa
0xa     0x0
0xb     0x0
0xc     0x11
0xd     0x11
0xe     0x2
0xf     0x22
0x10    0x33
0x11    0x33
0x12    0x44
0x13    0x44
0x14    0x55
0x15    0x55
0x16    0x66
0x17    0x66
0x18    0x12
0x19    0x34
0x1a    0x56
0x1b    0x78
0x1c    0x4
0x1d    0x56
```

```
0x1e    0x78
0x1f    0x90

..executed 3274 instructions in 323 microseconds = 10 MIPS.

Done.
```

3.3. Limitations

simpleADL is fraught with limitations - and probably, errors. We don't propose to fix the limitations, because we intend a more complete toolkit which will be noticeably more capable. But just to reduce frustrations from discovering limitations, here's a list of some key ones:

Issue	Commentary
simpleADL generates default instruction fetch-and-decode code rather than using the code specified in the .adl file (that is, it ***ignores*** the adl file sections *initial, operate* and *halt*)	True, and this means that (for example) you can't specify an architecture with a delay slot; nor can you say whether *iptr* is incremented before the instruction executes.
Branch offsets are always in byte distances between instructions	True, and this means you can't specify an architecture in which the displacement is a number of words, rather than bytes.
There's always one operation per instruction	True, and this means you can't specify a VLIW.
The loader format is absolute, not relocatable.	Yes.
The executable model is only for a single processor	Yes.
The executable model doesn't give useful performance info, like ipc or MIPS.	True enough. But it's an *architecture* simulator, not an *implementation* simulator. You'll need to wait a bit for an implementation simulator, and for the ability to model things like caches. But you can compare architectures. For example, simpleRISC executes way fewer instructions than archTest for that trivial program. Same number of loads and stores, though. And much bigger code footprint for simpleRISC. *Note that Article 3 - Estimating Performance, actually shows how to create a useful performance model, including caches.*
There doesn't seem to be a way to write, say, *addi r7, 67503* in assembler source and have the assembler treat this as a pseudo instruction which might end up as a single op (if the literal field in my architecture's add immediate instruction is large enough) or an instruction sequence to build up the literal value somehow.	Yes. Annoying. Sorry. SimpleADL is seen mostly as a "oooh so that's how it's done " educational toy than a real world tool.
So I can write any C I like in the semantics definition of an instruction?	Yes, and that's another thing that will likely change. Having to correctly parse and translate the complete C language seems like much too much hard work for an architecture specification tool, which is why simpleADL doesn't even bother. But we will likely reduce the scope of what you can write, and how it's written in a more realistic tool, all the while keeping an eye on compiler generation and pipeline descriptions (when we get round to implementation models).

How about interrupts and exceptions?	Sorry, we don't do those in simpleADL.
How about MMUs and caches?	Caches *shouldn't* generally be part of an architecture because running your code with or without caches should in general only have a performance impact, not a change in the results - at least for uniprocessors (although aspects are architected for multiprocessors because coherence and the like). MMUs should be part of the architecture, but we got lazy. It should be pretty straightforward to add an MMU into your architecture, perhaps by writing a map() function which walks the MMU tables/PTEs and is called by a new version of the readMem() function. But then you'll have to write a lot of code, in assembler, to actually make use of the MMU. And you will need to add in exceptions/interrupts, too. *Note that Article 3 - Estimating Performance, actually shows how to create a useful performance model, including caches.*
I don't see a test suite. What makes you think this thing is correct?	It probably isn't, but (excuses, excuses) the bugs shouldn't affect the general structure of the software, so (excuses, excuses) it's still OK as an educational tool. Plus, finding the bugs is good for you.
I see *readMem()* and *writeMem()* as operations, but neither architectures have any store operations, and there's no example program which writes to memory. Do these reflect a fundamental issue?	Nope. We just got lazy and wanted to get something posted. This is one limitation that will get fixed in *simpleADL*, probably using the *Sieve of Eratosthenes* as the example program. Note that the label.asm program for the *r32* architecture reads memory and prints what it sees.
How about that compiler generator, then?	Not in *simpleADL*. Guessing at the semantics from the instruction description is way too complicated for an educational tool.
Isn't it cheating to use specific architected instructions to do I/O?	Somewhat. We could put a system call instruction into the architecture and then 'do' the syscall inside the model. But the effects are the same, except for using up an opcode or two.