CS311 - FA13: Archive

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October 30, 2013

1 Design

This assignment is to create a simple implementation of the UNIX utility *ar*. The utility will support the operations on archive files of appending, creating, extracting, listing and deleting. It will also provide a flag for verbose output and if time permits, a way to add modified files, after a delay, from a directory.

Since this *ar* revolves around the previously mentioned operations, I will be structuring the code in the same manner. Depending on the flag passed in, the program will call the corresponding function to perform the operation. A set of utility functions will be created as well to reduce code duplication, and improve code in a more self-documenting way.

When I start writing my program, I will begin with the user interface, that is the command line. Having the interface created first will make it easier for me to focus on the functionality of the program.

I will then walk though each operation that can happen document the steps it needs to take, i.e. open archive file, write file, etc. to flesh out what the utility functions might be. I will then focus on the single operation of *listing*, and use a pre-created archive file so as to reduce the number of concerns. From there I will itertively enable each flag until they all work and the program works as intended.

1.1 Versions

Up to 0.5 GNU ar will be used for testing.

- 0.0 Tests (all flags, all flags w/verbose)
- 0.1 List (-t)
- 0.2 Extract (-x)
- 0.3 Append (-q)
- 0.4 Quick Append (-A)
- 0.5 Create Archive when using (-q, -A)
- 0.6 Delete (-d)
- 1.0 Verbose (-v) - Change all printf statements to only execute when flag passed.
- 1.1 Timeout (-w)

1.2 Deviation

After getting through appending and table, I realized verbosity was a simple if check away, and added it. Instead of moving onto extract and delete right way, I stuck with append and table until they were complete and free of bugs. I did not put aside enough time to complete extract and delete.

2 Questions

What do you think the main point of this assignment is?

The main point of this assignment is to get us reaquanted with the C programming language, and to learn UNIX system calls.

How did you ensure your solution was correct? Testing details, for instance. This section should be very thorough.

Originally I planned to check my program by using the python unittest library and subprocess modules. I could tell from the initial work on this that it would turn into a project on it's own and abandoned it in favor of manual testing.

The majority of my problems came from the even/odd padding in the ar program. It was a while before I realized I had been modding the size by 3 instead of 2 to check if the size was even or odd.

Most of my manual testing involved having a base archive pre-created with 'ar -cq' and then running my program off of that.

What did you learn?

I learned that I am not as strong of a C programmer as I though. A majority of challenges I encountered dealted with converting between types. I became familiar with sscanf and sprintf, but I still do not feel entirely comfortable with converting types in C.

I also learned how to use open, write, read, getopt, and became more familiar with C.

3   Work Log

```
commit 1968c2b30b261ae1b1d4d2d635cc2cecfe85a54d
Author: Trevor Bramwell <trevor@bramwell.net>
Date:   Wed Oct 30 23:36:28 2013 -0700

    CS311: Remove 'test' directory

commit 16b6a4ad00850de4f2e0bd4a677ea6f63dd0050f
Author: Trevor Bramwell <trevor@bramwell.net>
Date:   Wed Oct 30 23:34:19 2013 -0700

    CS311: Work on extract. Incomplete.

commit 82d5fa68207e31d63c1c258ad3b01c1a17eb155d
Author: Trevor Bramwell <trevor@bramwell.net>
Date:   Wed Oct 30 22:27:40 2013 -0700

    CS311: Refactor header name printing

    Return the size of the string up till '/' instead.

commit 367526f3ac0d68e56543fd6606060d343dc7d43b
Author: Trevor Bramwell <trevor@bramwell.net>
Date:   Wed Oct 30 22:07:37 2013 -0700

    CS311: Fix bug in creating archive.

    Refactored reading and writing armag to own functions.

commit df54d39c12c5a56ef3be238569b496264ddec03f
Author: Trevor Bramwell <trevor@bramwell.net>
Date:   Wed Oct 30 21:08:39 2013 -0700

    CS311: Update append to create archive

    This will currently only copy over the files, not write out the archive
    header.

commit b80f6f6647e28f38bc399d7dc68add1c2275eb89
Author: Trevor Bramwell <trevor@bramwell.net>
Date:   Wed Oct 30 20:50:05 2013 -0700

    CS311: Add verbose output for append.

commit e367fc89e3700448be46dd5916db225f8e998a2d
Author: Trevor Bramwell <trevor@bramwell.net>
Date:   Wed Oct 30 20:43:52 2013 -0700

    CS311: Rework function delegation from flags.

    delete and extract are both stubbed out, with extract currently enabled.

commit 76b948ad1ffeb4b522030d93e8dcacebfb268c17
Author: Trevor Bramwell <trevor@bramwell.net>
Date:   Wed Oct 30 20:17:10 2013 -0700

    CS311: Fix style guide formatting issues.
```

Also created a header file to hold function headers.

commit 130640abae4541c06a09c41b05011292ce67c475
Merge: 7c53d84 ea77376
Author: Trevor Bramwell <trevor@bramwell.net>
Date: Wed Oct 30 19:47:52 2013 -0700

    Merge branch 'master' of github.com:bramwelt/homework

commit 7c53d8409cb08031bd484ae7427558982c883b8a
Author: Trevor Bramwell <trevor@bramwell.net>
Date: Wed Oct 30 19:28:34 2013 -0700

    CS311: Update write_file to take fewer arguments.

    Only need to pass in struct stat to get the info it needs.

commit fb532c531464421e934188f92ff99ffc4111dbfa
Author: Trevor Bramwell <trevor@bramwell.net>
Date: Wed Oct 30 19:16:08 2013 -0700

    CS311: Refactor append_file method.

    Seperates concerns for a lot of functions.

commit ea77376cd2e70815d3baca7112bed2ee896c1104
Author: Trevor Bramwell <trevor@bramwell.net>
Date: Wed Oct 30 10:52:05 2013 -0700

    CS311: Refactor printing a header name.

commit f2df3256dd034f87a0984820be5c206a1bbaaeef
Author: Trevor Bramwell <trevor@bramwell.net>
Date: Wed Oct 30 01:07:07 2013 -0700

    CS311: Add append_all functionality and enable flag

    Through process found bug in file name output for '-t'.

commit 4fbfdb1cd0e48546ffa4944704affeb4b1f17004
Author: Trevor Bramwell <trevor@bramwell.net>
Date: Wed Oct 30 00:12:13 2013 -0700

    CS311: Fix bugs in print_hdr, fmt_filename, append

    Append was not taking into account odd size padding.

commit 05f2d4ada92c959d104aa81b1e15026d21c58f01
Author: Trevor Bramwell <trevor@bramwell.net>
Date: Tue Oct 29 23:09:36 2013 -0700

    CS311: Implement the verbose table option.

    Uses file_perm_string from class website, strftime, and sscanf.

commit 9eb6bff03913dbe5aa2b4cbbcc23eec85cfa45a6
Author: Trevor Bramwell <trevor@bramwell.net>
Date: Mon Oct 28 23:31:18 2013 -0700

    CS311: Fix bug in printing table.

```
    * I can math good.
    * I was moding by 3, not 2 to check even/odd. D'OH\!
```

commit 1dcbabd333db36cb3d159b715537193d42b72bf8
Author: Trevor Bramwell <trevor@bramwell.net>
Date: Mon Oct 28 23:00:22 2013 -0700

    CS311: Add test archives of even/odd files.

commit 502b22e252ef0cff0c1a42dea26d4b596222d34f
Author: Trevor Bramwell <trevor@bramwell.net>
Date: Mon Oct 28 22:55:51 2013 -0700

    CS311: Remove 'test_archive'

commit a20f76a620fec61459d4bffcf179176858d59469
Author: Trevor Bramwell <trevor@bramwell.net>
Date: Mon Oct 28 22:54:33 2013 -0700

    CS311: Move test-ar to subdir, add symlink to myar

commit 16ca85d143701d86bb152c89652e1780e33e8e84
Author: Trevor Bramwell <trevor@bramwell.net>
Date: Mon Oct 28 22:49:15 2013 -0700

    CS311: Fix issues with '-t', and '-q'

    append file:
    * No longer malloc a char buffer, but statically allocate one with
      blk_size from the file stat.
    * Always add a newline after a file. This fixes some stability with ar,
      but may be only working because the file are of odd length.

    open_archive:
    * Fix read and memcpy return checks

    table:
    * Walks the file in a much saner way. Checks correct return values from
      strtol.

commit 3905cf1198b4302cc56c7770b7c2a2dd797a47e2
Author: Trevor Bramwell <trevor@bramwell.net>
Date: Mon Oct 28 22:44:54 2013 -0700

    CS311: Use fmt_filename in build_hdr.

commit 79c612cac4d27c5787527a6d3d58bab25237a0d9
Author: Trevor Bramwell <trevor@bramwell.net>
Date: Mon Oct 28 22:41:25 2013 -0700

    CS311: Add fmt_filename function.

    Formats filenames to the ar spec of 16 character limit, with the 16th
    being '/'.

commit 6c21e55bba2df6a05897ceefd9ab7ba063b06dfe
Author: Trevor Bramwell <trevor@bramwell.net>
Date: Mon Oct 28 11:39:32 2013 -0700

```
    CS311: Add append_file method.

    Allows appending a file to an archive.
      - Builds the header
      - Appends the header
      - Appends the file

commit f4be90b510aee44452b8d9c970df59dbac5ce5c4
Author: Trevor Bramwell <trevor@bramwell.net>
Date:   Mon Oct 28 11:36:55 2013 -0700

    CS311: Update build_hdr to return the blk_size.

commit f853c98e92a1a70cadbcf78679eaf37709061ed2
Author: Trevor Bramwell <trevor@bramwell.net>
Date:   Mon Oct 28 07:23:06 2013 -0700

    CS311: Rename print_header and add build_hdr.

    Quick append now available, but not fully functioning.

commit c84a47302a9d5ebe740b46408267e4271c560ae0
Author: Trevor Bramwell <trevor@bramwell.net>
Date:   Sun Oct 27 13:53:38 2013 -0700

    CS311: Add variable to hold archive and file names

commit 1fba86fba9ce88ff866545b52df0bdd2cecf9c1e
Author: Trevor Bramwell <trevor@bramwell.net>
Date:   Sat Oct 26 17:20:23 2013 -0700

    CS311: Don't declare unneccissary strtol var.

commit b068d06f044fda9e6757b77e95c69a2e2c65bec7
Author: Trevor Bramwell <trevor@bramwell.net>
Date:   Sat Oct 26 15:13:56 2013 -0700

    CS311: Move flags, only allow '-t' for now.

      * Verbose is now it's own variable.
      * Output some flag debugging if verbose is set.
      * Fail if no flags are set.

commit 8588c7faabd85ac5a676bf1a3f56468e38f9f04a
Author: Trevor Bramwell <trevor@bramwell.net>
Date:   Sat Oct 26 14:15:28 2013 -0700

    CS311: Define flags and set them given options.

commit 3e595a2867fc842aafd1305b7a09bcc14ded6ab0
Author: Trevor Bramwell <trevor@bramwell.net>
Date:   Sat Oct 26 13:34:27 2013 -0700

    CS311: Create open_archive and close_archive funcs

commit ec98ea97ea54948736c9739f6b0e026d306e6311
Author: Trevor Bramwell <trevor@bramwell.net>
Date:   Sat Oct 26 13:11:32 2013 -0700

    CS311: Implement table as default behavior.
```

```
commit fc142a9c0ce05af80c77c289002b08a57ed1f1ad
Author: Trevor Bramwell <trevor@bramwell.net>
Date:   Wed Oct 23 00:24:43 2013 -0700

    CS311: Add comment for Append all

commit 2f4a63a23d46aafc261cd7cd8b684ed07d060e5a
Author: Trevor Bramwell <trevor@bramwell.net>
Date:   Tue Oct 22 23:44:41 2013 -0700

    CS311: Comment ALL the things!

    Add comments/psudocode for every operation.
    Begin figuring out shared similar functions.

commit bec6c05d5589b875dbc0e484748cb05119384f42
Author: Trevor Bramwell <trevor@bramwell.net>
Date:   Tue Oct 22 22:56:07 2013 -0700

    CS311: ignore pyc files.

commit 75d5fdd914870859975cc9b5e4ec029d406b0b45
Author: Trevor Bramwell <trevor@bramwell.net>
Date:   Tue Oct 22 22:55:16 2013 -0700

    CS311: Add tests for '-t' flag.

    Includes dummy ar files for testing.

commit 90b87a602c92057d0db534b7b0cb9761b2cb5819
Author: Trevor Bramwell <trevor@bramwell.net>
Date:   Tue Oct 22 22:00:07 2013 -0700

    Add TESTS macro to Makefile to point to test binary.

    Initial commit of test-ar.py. Description in file comments.

commit 3b1d29915ac0d73e128414ef60fd7236bda1b624
Author: Trevor Bramwell <trevor@bramwell.net>
Date:   Tue Oct 22 21:51:05 2013 -0700

    CS311: Update Makefile to default build myar

commit 0d0a6306a5500428d5ff67baf4ac7df5a47b59a0
Author: Trevor Bramwell <trevor@bramwell.net>
Date:   Tue Oct 22 21:47:52 2013 -0700

    CS311: Compiled initial writeup.

commit bc00277e2d188b41f6eda1ac43278caeeb3da568
Author: Trevor Bramwell <trevor@bramwell.net>
Date:   Tue Oct 22 21:47:45 2013 -0700

    Ignore object files and latex output files.

commit 6ad2ade11e7a7f7eb50424dd67bc0d71957fef28
Author: Trevor Bramwell <trevor@bramwell.net>
Date:   Tue Oct 22 21:46:38 2013 -0700
```

```
    CS311: Itemize version list in writeup.

    Also fixes compilation errors.

commit 2f1f768a7518e15e3c8dddbfffcafc3cc8fc10f6
Author: Trevor Bramwell <trevor@bramwell.net>
Date:   Tue Oct 22 21:40:41 2013 -0700

    CS311: Move Makefile and myar back up a directory.

commit 6699244d9d19993f2f45062190cf113ba8322987
Merge: 5803e73 78034aa
Author: Trevor Bramwell <trevor@bramwell.net>
Date:   Tue Oct 22 21:40:00 2013 -0700

    Merge branch 'master' of github.com:bramwelt/homework

    Conflicts:
     CS311/assignments/assignment2/write-up.tex

commit 5803e73e24b7682e4dc669557f8b1f303371b50d
Author: Trevor Bramwell <trevor@bramwell.net>
Date:   Tue Oct 22 21:38:07 2013 -0700

    CS311: Writeup design section

    Walk through design process, and provide intial answers to the first two
    questions.

commit b4945a6977a41ffb3db794c772d12643146953a4
Author: Trevor Bramwell <trevor@bramwell.net>
Date:   Mon Oct 21 20:40:16 2013 -0700

    CS311: Let us begin with getopt.

    Supports all options, and prints all arguments.

commit 82003b2548a0f37e0c08e7036580939f6f8578dc
Author: Trevor Bramwell <trevor@bramwell.net>
Date:   Mon Oct 21 20:08:08 2013 -0700

    CS311: Change Makefile to not link anything.

    Also defaults to print the help text.

commit dfd8d466f8140043568128324344f3cc18005dccd
Author: Trevor Bramwell <trevor@bramwell.net>
Date:   Mon Oct 21 19:55:27 2013 -0700

    CS311: Initial Writeup Outline.

commit b4a46f62bbcb8c86e19d99def7cf6c701e9bb579
Author: Trevor Bramwell <trevor@bramwell.net>
Date:   Mon Oct 21 19:54:47 2013 -0700

    CS311: Remove extraneous html from instructions.html

commit 30ae134104cd27c8403f666e753f05435696e6fc
Author: Trevor Bramwell <tehriddler@gmail.com>
Date:   Sat Oct 19 17:29:28 2013 -0700
```

```
    CS311: Assignment 2 - Makefile & initial writeup

commit f83e2edd7cdaf2a7bee443cc8439936d9403f258
Author: Trevor Bramwell <tehriddler@gmail.com>
Date:   Fri Oct 18 09:53:09 2013 -0700

    CS311: Move instructions under subdir.

commit e518292bcd1c1219810f72565ca5eb28c225edc1
Author: Trevor Bramwell <tehriddler@gmail.com>
Date:   Wed Oct 16 19:30:07 2013 -0700

    CS311: Instructions for assignment 2.
```