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CS410 Progress Update

The project chosen was: 2.1 Meta Toolkit - Enhance available tutorials for installing and using the tool on different platforms.

1) Which tasks have been completed?

To ensure that nothing is left over from previous installations and make sure the tutorials will work starting from zero, multiple spare PCs were set up with SSD drives to allow quick, fresh installations of operating systems and the MeTa code. 3 PCs have thus been set up to allow working on them in parallel, so what while one is busy installing or compiling, work can be done on another.

The latest versions of two popular Linux distribution (CentOS 8.2.2004 and Ubuntu 20.04 LTS) and the latest version of Windows 10 (October 2020 release) were installed.

MeTa was successfully installed on both of the above Linux versions after significant troubleshooting (see section #3 below).

Metapy and pytoml were successfully installed on CentOS. Troubleshooting is still underway to try to get it working on Ubuntu.

Detailed notes were taken on the installing and troubleshooting efforts (and the discovered workarounds) so far, which will be turned into HTML tutorials for the MeTa toolkit webpage.

2) Which tasks are pending?

The next task which is pending is to further troubleshoot and find a way to get metapy to install on Ubuntu. There have been significant challenges to doing this, see part 3 below for details.

Another task that is pending is to try to installing MeTa and metapy on Windows. With all of the problems discovered trying to get it working on the Linux versions, it was not possible to get to the Windows attempt yet, but hopefully in the next several days that will be possible.

Next, as mentioned in the project proposal, investigation will be done into whether MeTa and/or metapy can be installed on a Chromebook. Given all of the issues uncovered in just getting it to work on newer versions of Linux where it had worked before, it is looking less likely to be able to get it working on a Chromebook, but a good attempt will be made to see if its workable.

Then HTML versions of the installation notes will need to be created and placed on the project Github site, and following that the installation instructions will be followed one more time from scratch to ensure they work correctly.

Finally, the final project writeup/documentation will need to be completed.

3) Are you facing any challenges?

Yes, several issues have arisen related to installing MeTa and metapy. MeTa/metapy don't seem to have been maintained recently. In the case of MeTa, I would estimate around 5 years, given that the existing tutorials refer top Ubuntu version 14.04 LTS and GCC version 4.8.5, which were released 6 and 5 years ago respectively. Metapy seems to be more recently maintained, within the past couple of years. Quite a few things have changed in those past several years that make it difficult to install MeTa and metapy.

First, the source files for MeTa and metapy both download and compile versions of the unicode utility icu4c (version 58-2 for MeTa, 61-1 for metapy). Icu4c is no longer hosted at the site given in the sourcecode (icu-project.org), the source code is now hosted on Github instead. I needed to go through the error logs from the compiler to see where it was calling that, and then adjust the source files to point to the new Github location. This affected MeTa on both CentOS and Ubuntu, but only metapy on Ubuntu. Metapy for CentOS appears to use a pre-compiled version, but for Ubuntu it wants to compile the source code to install it. I am still working on changing the source code to fix this (it is not as easy to work with the source code for metapy, as the pip installer tries to do it all in one operation, I'm working on how to break this into a download step and then a compile/installation step so that the source code can be modified in-between those two steps. This code repository change appears to have been a recent change (in the last month or two), as I used metapy on Ubuntu 20.04 LTS to do MP2.2 for the class, and it installed with no issues then, but won't install now on a fresh installation of Ubuntu 20.04 LTS.

Next, the MeTa source code includes xlocale.h. This was part of glibc, but was removed a few years ago, and is not included in current Linux systems. In troubleshooting this, it was determine that for CentOS, it needed to be pointed to /usr/include/bits/types/__locale_t.h instead, while for Ubuntu, it should be redirected to /usr/include/locale.h.

Finally, Meta not compatible with the GCC 8 (CentOS) and GCC 9 (Ubuntu) versions that are part of the modern Linux distributions. The way that operator overloading is handled changed changed between gcc 7 and 8, and since the MeTa sourcecode uses this, it will not compile. GCC 7 had to be installed and used to compile MeTa instead of the version 8 or 9 that came with the OSes. This was easier done on Ubuntu than on CentOS. On Ubuntu, it was possible to point the package installer apt-get to an archive site and install a GCC 7 package relatively easily. For CentOS, there did not seem to be any equivalent archive for the yum package installer used by that OS. The source code for GCC 7 had to be downloaded and compiled from scratch to install it. Given the enormous size and complexity of GCC, this took several hours to compile.

Hours spent so far:

Installing SSDs and RAM in PCs: 1 hour
Downloading install ISOs and creating install USB sticks for several OSes: 1 hour
Installing OSes: 1 hour
Installing MeTa: general installation testing: 1 hour
Installing and Troubleshooting MeTa installation: icu4u repository change: 3 hours
Installing and Troubleshooting MeTa installation: xlocale.h fix: 1 hour
Installing and Troubleshooting MeTa installation: GCC version issues fix: 6 hours
Installing metapy/troubleshooting on Ubuntu: 2 hours so far (ongoing)
Writing this summary report: 2 hours

Estimated time spent so far: 18 hours