Installation of Clips software

There are several additional software components needed for full operation of the Clips script compiler and assembler. These are listed below, first with a brief description of what they are and why they are required, followed by instructions on where and how to obtain the software. Once these are installed, you won't need to think about them again; the Clips software will know how to access them.

UNIX familiarity is required and is assumed. Extensive Mac OS X familiarity is also required and assumed.

Before you start:

- Scan or read these instructions carefully in their entirety.

- Make sure you have at least 20–30 GB of free disk space on your boot volume.

- Be sure you understand how to use the UNIX Terminal application in Mac OS X and that you are very familiar with Mac OS X. Installation of this software is not for the faint-hearted.

I. Overview

This document will walk you through installation of each of the following.

- **Mac OS X Speech Synthesis voices.** In addition to the two high-quality voices that are preinstalled on every new Mac, there are 14 other English-speaking voices which can be installed, two of which are quite good and are much better than the defaults. If you're certain that you'll be replacing all of the computer-generated audio with your own recorded voice, then these can be skipped (or added later) and you can start with the preinstalled, lower-quality voices. The optional voices are easy to install, but together will require 5 to 7 GB of disk space.

- **MacT$_E$X.** This is a very large suite of open-source software tools encompassing a Mac OS X release of the T$_E$X typesetting system. This will require 5–7 GB of disk space.

- **Xcode Development Tools.** This is a very large suite of software tools from Apple which allow anyone to develop new software for Mac OS X, and is a prerequisite for installing the remaining items. This will require 4–5 GB of disk space.

- **MacPorts.** This is an open-source software tool with which other software tools can be installed. It is needed for the remaining components.

- **ImageMagick.** This is an open-source tool for doing all sorts of image manipulation and is needed by Clips for converting PDF documents to PNG images.

- **NetPBM.** This is a suite of open-source image-manipulation tools needed by the Clips compiler for slicing and dicing images used in the lesson interpreter.

- **poppler.** This is a small suite of open-source tools needed by Clips for splitting a PDF document apart into separate pages.

- **sox (<u>so</u>und e<u>x</u>change).** This is an open-source tool needed by Clips for optimizing and transcoding the audio into MP4 and OGG audio formats for cross-browser compatibility and running in a web browser.

- **gfind (GNU Find).** This is an open-source filesystem tool needed by the Clips compiler as an alternative to the standard UNIX "`find`" tool.

- **Graphviz.** This is an open-source tools used for generating a node graph showing the interrelations of the Clips frames, which is useful in visualizing and checking the complex branching of a lesson while it is being developed.

- **Clips compiler and assembler.** Finally, this is the Clips software itself, which is used to create interactive lessons.

II. Installation

Mac OS X Speech Synthesis voices

For the speech synthesis voices, the place to start is System Preferences. Go to the "Dictation & Speech" settings and select the "Text to Speech" tab. From there, click the drop-down list labeled "System Voice" and select "Customize…" at the bottom of the list. A smaller popup window will appear. In that window, check one or more of the following and then click "OK". Note that Ava and Lee are *required voices* by the Clips software:

```
English (United States) -- Female
        [✓] Allison
        [✓] Ava                ← Required voice
        [✓] Samantha
        [✓] Susan
English (United States) -- Male
        [✓] Alex
        [✓] Tom
English (Australia)
        [✓] Karen
        [✓] Lee                ← Required voice
English (India)
        [✓] Veena
English (Ireland)
        [✓] Moira
English (Scottish Standard English)
        [✓] Fiona
English (South Africa)
        [✓] Tessa
English (United Kingdom)
        [✓] Daniel
        [✓] Kate
        [✓] Oliver
        [✓] Serena
```

Your computer will then begin downloading each of these voices from Apple. It will take at least an hour, as the files for the voices are large. We recommend leaving the System Preferrences pane open in order to check on the download progress periodically.

Xcode Development Tools

Xcode must be installed via the Mac App Store. Launch the "App Store" application (in your computer's Applications folder) and sign in using your Apple ID (if necessary). Then, in the search box in the upper right corner, type "Xcode" and press Return. The first search result should say "Xcode Developer Tools"; it has an icon depicting a hammer and a blueprint. Next to that icon, click "GET" and then "INSTALL APP". This will begin the (long) process of downloading Xcode from the App Store and onto your computer. The easiest way to check on the download progress is to go into Launchpad (via either the F4 button on your laptop or by going to the "Launchpad" application in your Applications folder). When Xcode has finished downloading, it should automatically install itself in your Dock. But if not, you can always launch it from the Applications folder. Launch Xcode to verify that it was installed correctly, and then simply Quit it.

Next, there is a sub-component of Xcode to install called the "Command Line Tools." These are needed for doing any serious software work inside the Terminal application. To install the tools, open a web browser and navigate to:

`http://developer.apple.com/downloads/index.action`

There, in the search box at the upper left (but not the one at the upper right!), type "Command Line Tools" and press Enter. At the top of the search results should be an item labeled something like "Command Line Tools (OS X 10.10) for Xcode – Xcode 6.1.1" dated December 2, 2014. This is the appropriate item to download for an OS X 10.10 Yosemite system. *(Newer releases will have a different version and date.)* Click on the disclosure triangle and then click the blue link at the right, next to the little paper with the hard drive icon. This will begin downloading a 100 MB disk image file into your Downloads folder, which should take only a couple of minutes.

When the download completes, look for it in your Downloads folder (it will be a file called something like "`commandlinetoolsosx10.10forxcode6.1.1.dmg`") and double-click it to open it. A small Finder window containing a brown and yellow box icon in a will appear. Double-click the box icon (it should say something like "`Command Line Tools (OS X 10.10).pkg`" below it) and follow the installation steps, accepting the defaults. When the installer completes and exits, you can then eject the Command Line Tools disk image using the Finder and then move the disk image (`.dmg`) file to the trash, as it will no longer be needed.

At this point the command line tools should be installed. To verify this, open the Terminal application (in Applications > Utilities) and at the command prompt type "`which gcc`" and press Enter. If all is good, it should print out "`/usr/bin/gcc`".

One final step with Xcode is to accept its software license. In a Terminal window, type "`sudo xcodebuild -license`" and press Return. This will prompt you for your computer's password as a security precaution. The reason for the security precaution is because the "`sudo`" command causes the following commands to be run as the computer's superuser (a Unix feature, similar to an Administrator account). Following acceptance of your password, it will display the terms of the software license and ask you to accept.

MacTEX

To install MacTEX, navigate to:

`http://tug.org/mactex/`

New versions of MacTEX are released once yearly, usually in July. You will want the most recent distribution available, which is available by clicking "MacTeX Download", which will bring you here:

`http://tug.org/mactex/mactex-download.html`

From there, click the link labeled "MacTeX.pkg". This will download a very large file called something like "`mactex-20150613.pkg`" into your Downloads folder. The download process may take two or three hours. When it is complete, locate the file in the Finder and double-click it, which will launch the MacTEX installer. (Keep this Finder window open so that you can delete the "`.pkg`" file later.)

Follow the instructions in the MacTEX installer. When installation is complete, delete the "`.pkg`" that file you downloaded. (Emptying the trash immediately afterwards is also a good idea, since the package file is large.)

Finally, type "`echo $PATH`" to verify that `/Library/TeX/texbin` is somewhere on your path.

MacPorts

To install MacPorts, navigate to:

`http://www.macports.org/install.php`

and click the Quickstart link labeled "OS X 10.10 Yosemite" (or whichever is appropriate to your operating system version). This will download a small file called something like "`MacPorts-2.3.3-10.10-Yosemite.pkg`"

or "`MacPorts-2.3.4-10.11-ElCapitan.pkg`" into your Downloads folder. When the download is complete, double-click the `.pkg` file to launch the installer. Follow the installation steps, accepting the defaults. You will probably be prompted for your computer's password again, as the software needs special privileges.

Note: The progress bar may appear "stuck" at 80% or so and appear as though the installer has hung up or stopped functioning. It may actually sit there for 45 minutes or more — with your computer's fan running the whole time, while it downloads, compiles, and configures various software components — but it should eventually complete. (Older versions of MacPorts prior to Mac OS X 10.11 El Capitan installed very quickly.)

When the installer reports that installation is complete and exits, you can move the `.pkg` file to the trash.

At this point, MacPorts should be installed. To verify this, open a Terminal window and type "`port help`" and press Return. It should display a bunch of help text, which you can ignore.

ImageMagick, NetPBM, poppler, sox, gfind, GraphViz

The last steps are easy for you, but they will make the computer work very hard for possibly up to an hour or more. Using the MacPorts installer, you can install all of the remaining software using a single typed command. In a Terminal window, type the following and press Return:

```
sudo port install ImageMagick netpbm poppler sox findutils graphviz
```

Depending on how much time has elapsed since the last "`sudo`" command, you may or may not need to re-enter your computer's password.

(If you're curious: "`port`" is the actual name of the MacPorts software program, and "`sudo`" is the portion of the command line which tells your system to run "`port`" as the superuser. "`install`" is a subcommand of "`port`", and the remaining four words are the names of the software packages that "`port`" is supposed to install.)

Your computer will display lots and lots of text in the Terminal window as it automatically fetches and builds these four programs and their dependencies. It may take up to an hour to do this, and your computer's fan might make noise, which is normal for this step.

When the installation is complete, you should see a "`$`" prompt again, and hopefully there were no error messages displayed (which would appear directly above it). To confirm that the installation was successful, type the following and press Return:

```
port list installed
```

This will list several dozen packages. Among them should be `ImageMagick`, `netpbm`, `poppler`, `sox`, `findutils`, and `graphviz`. The others are packages which were installed automatically as dependencies.

If everything looks good, you can close the Terminal window.

Clips compiler and assembler

Two archives in compressed-tar-format are needed. One is for the Clips *compiler*, the other is for the Clips *assembler*. The Clips compiler takes the master source document for the lesson and translates it into an intermediate format. The Clips assembler then takes the intermediate format and translates it into another special format that the lesson interpreter (lesson player) loads in a web page when a student works through a lesson.

To install these components, navigate to:

```
http://itutor.cbs.umn.edu/software/
```

and click the links containing the most recent assembler and compiler. For example, at the time of this writing, the most recent releases are:

- clips-v3-compiler-20150307.tar.gz

- clips-v3-assembler-20151207.tar.gz

Each of these must be extracted using "`tar -zxpvf filename`" on the command line.

The compiler archive will extract into a directory structure named something like "`clips`". Inside this directory, create a new directory called "lessons" or "modules" for producing content.

[to do] Determine directory structure of Clips compiler from CL.

[to do] Receive copy of generalized Clips compiler from CL and upload to software site.

[to do] Run through a practice download of the Clips compiler, including compilation of `s2` and (possibly) `cpt` from source.

[to do] Produce a test lesson to verify that the software is installed correctly and is functional. This is not an *example* lesson for any sort of human understanding but rather an auto-test for the software to run and report problems.

[to do] Each lesson (or module) assumes that the Clips assembler is present in a subdirectory called "assembler". If you are producing multiple lessons, we recommend configuring a symbolic link to the original location rather than making a copy of the assembler for each lesson.

[to do] Show example of proper verification:

```
...........
Tool "pdfinfo" (Required)                Present       [  OK  ]
Tool "pdfseparate" (Required)            Present       [  OK  ]
Tool "pdftoppm" (Required)               Present       [  OK  ]
Tool "pdftk" (Highly Recommended)        Not Present   [  OK  ]
Tool "pgmmake" (Required)                Present       [  OK  ]
Tool "pnmcrop" (Required)                Present       [  OK  ]
Tool "pnmtopng" (Required)               Present       [  OK  ]
...........
```

etc…anything else?

III. System Upgrade

If you happen to upgrade your OS X system while the Clips software is installed, for example from OS X 10.10 to 10.11, then you might need to reinstall MacPorts and/or MacTeX for one reason or another.

Proceed at your own risk…

- If you need to reinstall MacPorts, one way to do this is to type

      sudo rm -rf /Applications/MacPorts /opt/local

  which will ask you to type your administrative password for the "`sudo`" command, and then it will remove the MacPorts installation. (Note: If nothing is found to delete, it will just return to the command prompt immediately.)

  Following this, you can re-install MacPorts as outlined earlier.

- If you need to reinstall MacTeX, one way to do this is to type

      sudo rm -rf /usr/local/texlive /Applications/TeX /Library/TeX

  If will again ask you to type your administrative password for the "`sudo`" command (unless it's been less

than 5 minutes since the last "`sudo`" command), and then it will remove the MacT_EX installation.

Following this, you can re-install MacT_EX as outlined earlier.

IV. Etc., etc.

etc., etc., etc., etc.

etc., etc., etc., etc.

etc., etc., etc., etc.

etc., etc., etc., etc.