CS551 Computer Communications

Bill Cheng

http://merlot.usc.edu/cs551-f12

Today’s Topics

- Placement Exams
  - Replaces the old Diagnostic Exam
  - See web site for details
- Administrative Stuff
  - The instructor *cannot* give D-clearance
  - Please use the on-line D-clearance system
  - I have never waived a pre-requisite for anyone
  - PhD students to take Prof. Govindan’s or Prof. Heidemann’s section of CS 551 (or talk to me)
- Review Course Organization
- Warmup project #1
- Review sockets programming

Class Structure

- Instructor: Bill Cheng <bill.cheng@usc.edu>
  - Lecturs: MW 10:00am - 11:20am in ZHS 252
  - Email: 24 hour turn-around
  - Office Hours: in SAL 218, M/Tu/W/Th 2:00pm - 3:00pm or by appointments
- TA: Bo-Chun Wang <bochunwa@usc.edu>
  - Email: 24 hour turn-around
  - Office Hours: (TBD)
- Grader: Abhiram Kalluru <kalluru@usc.edu>
  - We have different rules about grader involvement
  - Please do not contact the grader about an assignment before the assignment is due
  - The grader will hold office hours after you get grade notification e-mail

Class Resources

- Class web page: http://merlot.usc.edu/cs551-f12
  - Lecture notes posted here soon (hopefully) after class
  - Project assignments & may be HWs
  - Reading list
  - News section
  - You should check this site regularly
- If you see inconsistencies, especially regarding any type of "rules" between what’s on the class web page and what’s on a set of lecture slides that has been covered in class
  - usually, the lecture slides are correct
  - but, you should check with the instructor as soon as possible!
    - so that things can be consistent again

Class Google Group

- Google group
  - Student-to-student discussions about programming assignments
  - Exchanging *ideas* are allowed
  - Posting code is *not* allowed (short code segments to illustrate ideas are allowed; short means < 5 lines)
  - Instructor & TA will also post answers to questions here
    - if appropriate for whole class
  - You can also initiate discussions about course material
    - go offline when approprate

Class Google Group

- You *must be a member* of the *class Google Group*
  - *All* important announcements will be posted to this group

- There are two way to use the class Google Group
  1) use it as an e-mail reflector (i.e., don’t need to "login" to the Google Group)
     - get an e-mail copy of everything posted to the group
     - send postings to the group
     - you *don’t need* a Google account
     - if you are a conscientious objector to Google, this may be your only option (and you will have to manage ALL messages posted to the class Google Group)
  2) full access (i.e., "login" to the group, search the message archive, post using web form, etc.)
     - you *must have* a Google account

Class Google Group

- If you are on the class roster, I will invite you to join with the class Google Group some time during the first week of class
  - By default, I will use your USC e-mail address
    - the default mode of using the class Google Group is e-mail reflector
  - If you want to use a different e-mail address to access Google Group, please apply for membership
    1) *do not accept* the invitation
    2) apply for membership with your "other" e-mail address
       - make sure you provide your *USC e-mail* address in the *"additional information"* field (so I can verify that you are really in my class)

Course Readings

- Research Papers in Networking
  - Available online
  - Collection of classical and topical research
    - about 40 papers
    - may add papers as we go along

- Textbook as background, not required
  - L. L. Peterson and B. Davie
    “Computer Networks: A Systems Approach”
  - John W. Stewart III
    “BGP4, Inter-domain Routing in the Internet”
  - W. R. Stevens
    “Unix Network Programming: Volume 1: Networking APIs”
  - B. Nichols, D. Buttlar, and J. P. Farrell
    “Pthreads Programming”

Class Structure

- Lectures mostly based on papers
  - slides
  - lectures should be interactive
  - little use of optional textbooks
- You need to read the papers
- You have to *interpret* the papers
- What should you look for in the papers?
  - will discuss this later

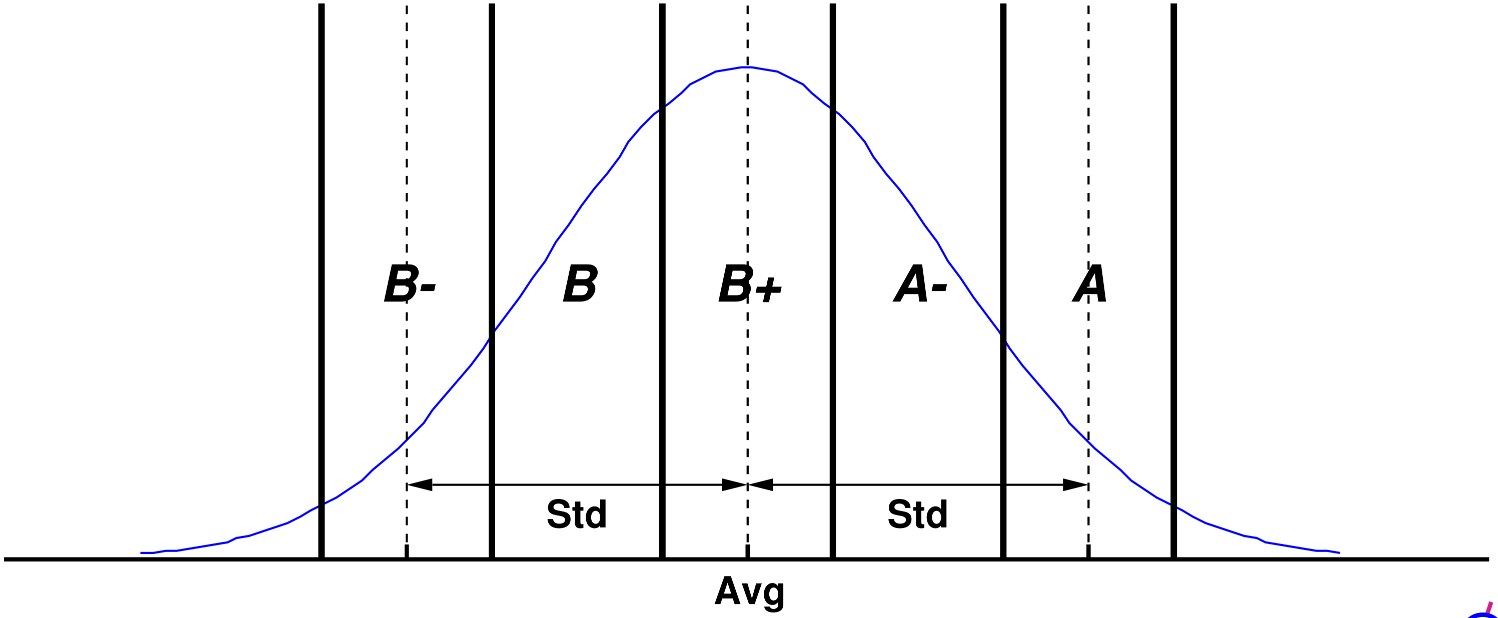
Grading

HW	0%	2-3 assignments, do not turn in
Rowcall	3%	starting from week 4 of classes
Projects	35%	2 warm-ups, 1 final project in two parts
Midterm	27%	in class, Thu, 10/25/2012 *(firm)*
Final	35%	8:00am - 10:00am, Mon, 12/17/2012 *(firm)*

- No extra credit
  - Try your best from the beginning!
  - Definitely no *individual* extra credit, there's no need to ask
- Projects graded by the grader
  Exams graded by the TA or the instructor

Grading (cont...)

- Final grade assigned by the instructor
  - On a curve, class average is probably a B+
  - C's will likely be given, F's if necessary
  - Loose guideline depicted below:



Grading (cont...)

- Fairness
  - Without fairness, grades have little meaning
  - The instructor *must treat all students equally* and cannot give special treatment to any particular student
  - Therefore, please do not ask special favors from the instructor because of your circumstances (except for ones that are explicitly allowed by the university)
  - This may seem unfair to you because you believe that your circumstances are special (understandably, everyone does)
  - But the rule the instructor must follow is that *whatever he offers you, he must offer to the entire class*

Sign Row Sheet

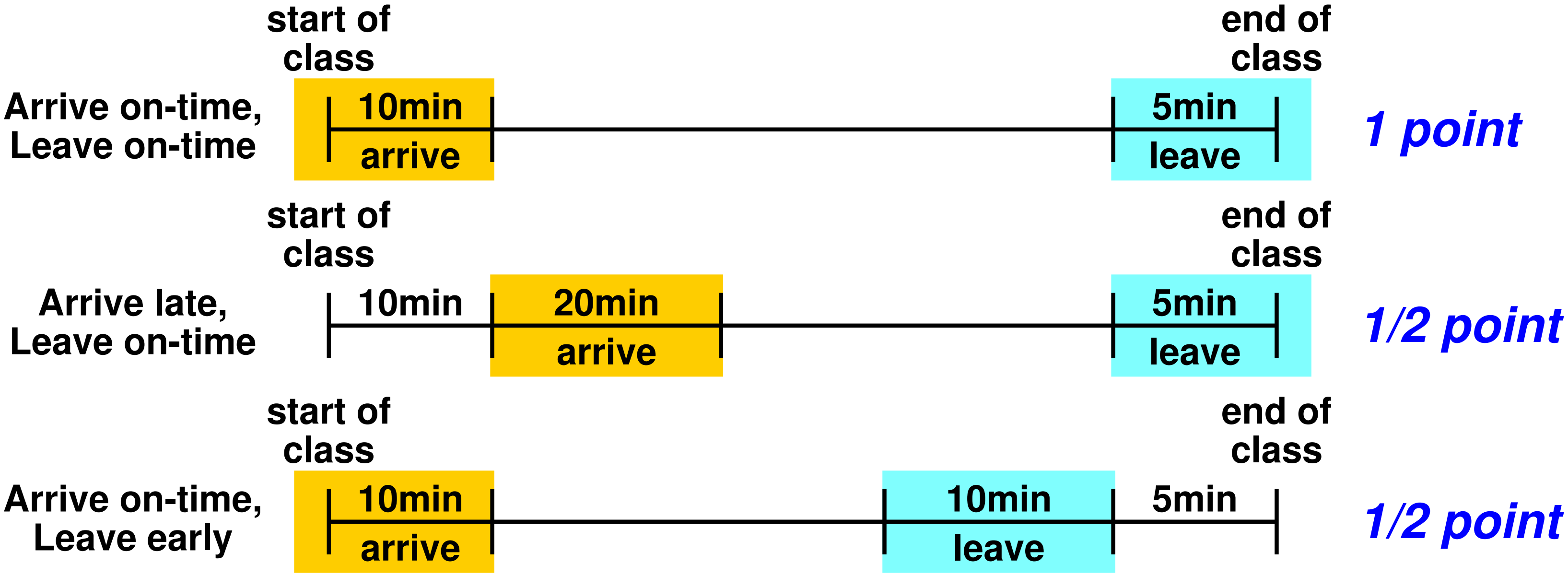
- For *on-campus* students only
  - If you are enrolled in the DEN section, you are not required to sign row sheets
  - DEN students normally have a slight disadvantage that they can miss stuffs happening in the class
    - this is served as an *"equalizer"*

Sign Row Sheet (Cont...)

- Starting from *week 4*, each lecture is worth 1 point
  - You should sign the row sheet as soon as you get into class
  - If your signature is on the row sheet, you get the 1 point
    - provided that you do not leave before class ends
  - If you come in between 11 to 30 minutes into class or had to leave class within the last 15 minutes, check *late* box to receive 1/2 a point credit instead
    - if you have to leave during class for something urgent and cannot check the "late" box or remove your signature, please e-mail me to do it for you
      - failure to do so would be considered cheating and will lose *all* class participation credits
  - If you are sick or have a family emergency, please bring a note from a doctor to receive credit

Sign Row Sheet (Cont...)

Sign Row Sheet Summary


start of class

end of class

Arrive on-time, Leave on-time

10min arrive

5min leave

1 point

start of class

end of class

Arrive late, Leave on-time

10min

20min arrive

5min leave

1/2 point

start of class

end of class

Arrive on-time, Leave early

10min arrive

10min leave

5min

1/2 point

- ***0 point*** **if** ***arrive way late*** **or** ***leave way early***

Homework Assignments

- HW (do not turn in for this semester)
  - Based on readings and discussion
  - Short programs in `ns` and `nam`
  - Acceptable formats are ASCII, PDF, PostScript, or HTML
    - proprietary formats such as MS-Word or human-unreadable formats such as LaTeX source will not be accepted

ns and nam

- Experimental but highly popular software packages
  - http://www.isi.edu/nsnam
- ns: network simulator
  - Discrete event simulator (OTcl front-end)
  - Implements many Internet protocols
- nam: network animator
  - Animates ns traces (and more!)

Programming/Project Assignments

- Programming projects
  - Sockets, multiple processes, multiple threads, etc.
  - Hopefully will give some practical insight
  - You need to learn to be *very precise*
    - know *every bit* that you are reading and writing
    - know exactly what each function is doing and the meaning of all its return codes
  - 2 small warm-up projects (10% each)
    - group projects *not* allowed
  - 1 large (5,000+ lines) final project, delievered in two parts (45% for part (1) and 35% for part (2))
    - part (2) depends on part (1) working properly
    - *group of two* students allowed, but must follow strict rules
  - (cont...)

Programming/Project Assignments (Cont...)

- **Programming projects (cont...)**
  - **No solutions will be given**
  - **C/C++ only**
  - **Must compile and run on *nunki.usc.edu***
  - **Makefile -** `make` **must work as is**
  - **Many requirements, please see specifications**
  - **Electronic submission only**
  - **We can only grade from our *grading account on nunki***
    - **test your code in someone else's account to make sure that your code does not *have to* run from your account**
  - **(cont...)**

Programming/Project Assignments (Cont...)

- Programming projects (cont...)
  - Grading will be *harsh*
    - you do not get credit for simply coding, you get credit for making sure your code *works according to spec*
  - *Grading guidelines* provided at least one week before submission deadline
    - this is *exactly* how we will grade your program
      - *no other grading procedure will be used*
      - so, you should run your code through them

Programming/Project Assignments (Cont...)

- Final project
  - Can be done either individually or by a team of two students
    - send commitment forms for team projects
    - deadline for the commitment forms is ***2 weeks*** before the project due date
  - From past records, there is ***no apparently advantage*** in having a partner for the final project
    - coordinate with a partner may not be so easy
    - wait till the last day to integrate code most likely will be disastrous
    - if you choose to do an individual project, please do not complain that others have an edge because they have a partner

Electronic Submissions

- Use *bsubmit* and the *Bistro* system (see web page for details)
  - You can make multiple submissions
    - will grade last submission by default
  - Bistro system gives tickets and receipts
    - these are *proofs* that the *server* got your submission
    - *we cannot trust any file timestamp*
    - we can only trust things that have made it to our server
  - Very important: *read output of bsubmit*
  - Very important: *verify your submissions*
    - see the bottom of the Electronic Submission Guidelines web page for details
    - if you forget a file in your submission, you are not allowed to resubmit it after the deadline
  - It is *your responsibility* to make sure that your submission is valid - *Be paranoid!*

Electronic Submissions (Cont...)

- Use *bsubmit* and the *Bistro* system (see web page for details)
  - No other form of submission will be accepted
    - use your judgement under special circumstances
- Account getting full
  - Please do not delete or alter anything in your `~/.bistro` directory
  - If you must delete your `~/.bistro` directory, you should tar then gzip the content of your `~/.bistro` directory and e-mail the resulting tgz file to the instructor:

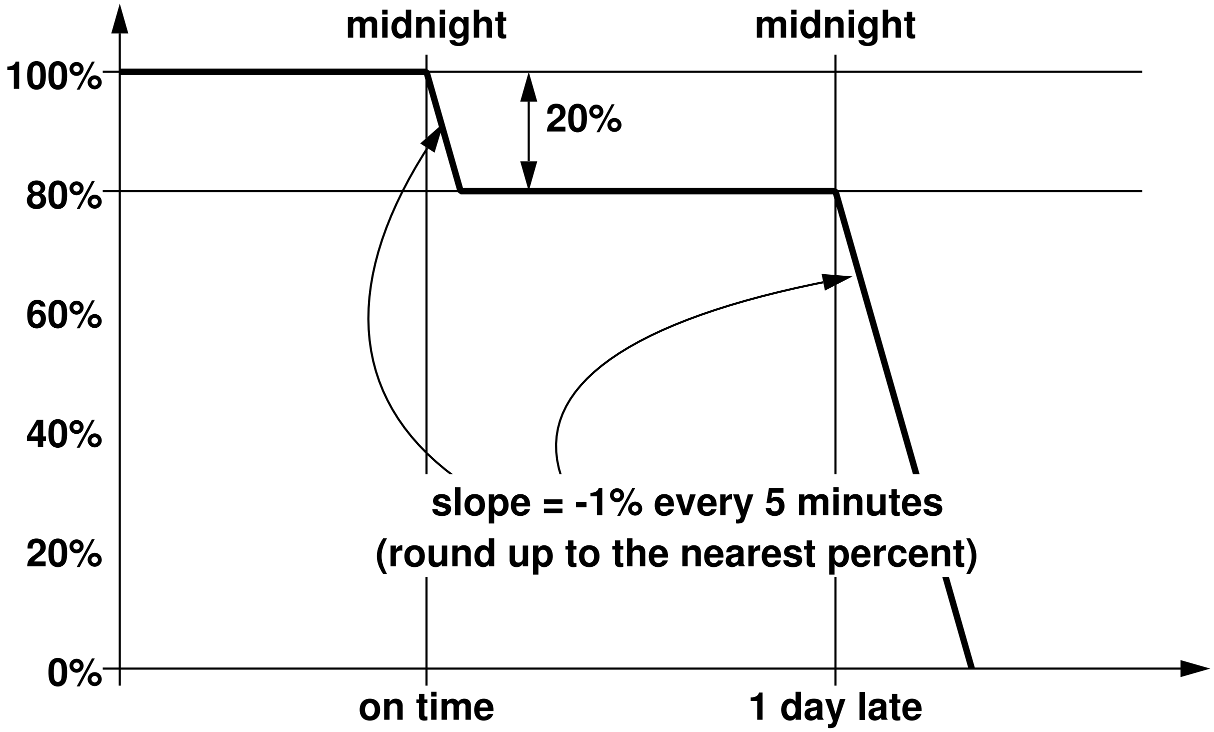
```
    cd; gtar cvzf $(USER)-bistro.tgz .bistro
```

  - Delete the directory only after you get an confirmation e-mail from the instructor (or at your own risk)

Late Policy

- **Electronically Submitted Assignments**
  - **You can submit multiple times, only the last submission will be graded (unless you send us an e-mail)**
  - **15 minutes grace period**
  - **80% of your score if within one day late beyond grace period**
  - **Although in the first 100 minutes of this period, you will only lose 1% of your grade every 5 minutes**
  - **See next page for details**
  - **Time is based on *Bistro server timestamp***
- **Extension *only possible* if you have a *note from a doctor* or other form of official proof of family emergencies**
  - **e.g., scheduling conflict with *work* will not be excused**

Late Policy



slope = -1% every 5 minutes
(round up to the nearest percent)

Late Policy

- I must stick to my policies
  1) Please do not ask for individual extension unless you have a *documented* proof of *illness* or a *documented* proof of *family (not personal) emergency*
  2) My "fairness" policy is: *"Whatever I offer you, I must offer it to the whole class"*
     - This is why I cannot give individual extensions
  - What if your laptop died? Home Internet disrupted? Car broken? Cousin got stuck at the airport? My house was on fire? Need to go to court? Need to go to Miami? And so on...
    - These are personal emergencies
    - Please see (1) and (2)

Modifications After Deadline

- After the submission deadline has past
  - You are allowed up to 3 lines of free changes, submitted via e-mail to the instructor, within 24 hour of the project submission deadline
    - clearly, this is not meant for major changes
    - you may want to anticipate that your submission may not be exactly what you thought you had submitted
  - One line (128 characters max) of change is defined as one of the following:
    - *add* 1 line before (or after) line x
    - *delete* line x
    - *replace* line x by 1 line
  - Additional modifications at 3 points per line (same deadline)
  - (cont...)

Modifications After Deadline (cont...)

- After the submission deadline has past (cont...)
  - Afterwards, additional modifications cost *12 points per line* for the next 6 days
  - Afterwards, it costs *30 points per line*
  - Applies to source code and README files
    - do not forget to submit files, *verify* your submission
      - this is *your responsibility*
    - we cannot accept missing files after deadline
    - a *filesystem timestamp* can be easily *forged*, so they cannot beused as *proof* that you have not modified the file after deadline
  - Try things out before your first submission deadline to get familiar with the *Bistro* system
  - *Re-test* your code after you have submitted to be sure

Regrade Policy

- Grades will be sent to individuals via e-mail
  - You must register for the class mailing list
- Regrade requests in writing
  - Submit within 1 week of initial grade notification
    - must follow instruction in grade notification e-mail
  - Regrade can be done after the 1-week deadline, but you must *initiate* a regrade request within 1 week
  - We reserve the right to regrade the whole thing

Scheduling Conflicts

- Midterm Exam
  - scheduling conflict with midterm exam must be resolved with the instructor at lease one week before the exam
- Final Exam
  - scheduling conflict with final exam means
    1) you have another exam that overlaps in time with our final exam
    2) you have two or more other final exams on the same day
  - if you only have another final exam on the same day is *not* considered a scheduling conflict
  - scheduling conflict with *work* is *not* considered a scheduling conflict
  - Documented illness will get an incomplete grade

Academic Integrity Policy

- The USC Student Conduct Code *prohibits plagiarism*
  - All work submitted for the class is to be *done individually*
    - except for the final project, please see web page for details
  - Code fragments obtained from *public sources* (or code derived or adapted from them) must be *explicitly cited* to give credits
  - Code fragments obtained from *private sources (or previous semesters)* are *not allowed*
  - Code fragments done by yourself for other classes must be cited explicitly
  - For more details, please see the *Academic Integrity Policy* section on the *Course Description* web page

Academic Integrity Policy (Cont...)

- You are encouraged to work with other students
  - "work with" does not mean "copy each other's work"
  - "work with" means discussing and solving problems together
    - this should happen at a *high level*
  - but be very careful when it's time to write code
    - must write code completely on your own
    - *do not write code together*
    - "sharing" even a *single* line of code is considered *cheating*

- If you cannot work together at a high level
  - you are advised not work together with other students

Program Checker

- Do not submit someone else's code
- How do we catch cheaters?
  - We use MOSS to analyze your submissions
    - http://theory.stanford.edu/~aiken/moss/
  - Analyzes code structure intelligently
  - We also have *all* projects from several previous semesters

Student Commitments

- Keep up with your reading
  - Complete relevant reading before class
  - Browse lecture slides before class
    - lecture slides will be available on-line before class
- Do your own work
- Turn in assignments on time
- Ensure gradable assignments
  - Programs must work on nunki.usc.edu
- You are encouraged to study with other students and *discuss* (no sharing) programming assignments and HWs
  - except for the final project where you can have a partner
- You are encouraged to ask questions, pretty much about anything related to programming

Student Commitments (Cont...)

- If you feel that you are falling behind
  - Talk to the instructor as soon as possible
- When you get stuck with programming
  - Ask the TA or the instructor for help
  - Don’t wait too long
- Please do not ask these questions in e-mails:
  - Here is my understanding of X. Am I right? Is this correct?
    - find a different way to ask
  - I don’t understand X. Could you explain X to me?
    - if you attended lectures, you can ask this during office hours
  - Here is what I am thinking of or doing... is it acceptable (or is this okay)?
    - can you ask this during exams?

Study for Exams

- Exams mostly are based on lectures
  - Although I reserve the right to ask anything from required reading
- Exam questions are often of the form "in N words or less, please give the *best* answer for the following question"
  - you must choose your answer and put it at the beginning of your answer
  - generic answer usually gets you very little partial credit
  - better answer may get you more points
- Do not review all lectures only right before the exams
  - otherwise, you may only be able to give generic answers because everything is a blur
  - you need to show that you know the difference between answers of different quality

Things to Do *Today*

- Read class web page: http://merlot.usc.edu/cs551-f12
  - Check course description and reading list
  - Click on a "request access" link from the class web page to get *user ID* and *password* to access protected part of the class web site
    - you will also get your *port assignment* (TCP port numbers which you must use in your projects) in the same e-mail
    - should do this even if you are not registered for the class but plan to take this class
  - Check warmup project #1 spec and *start coding*

Course Content Credit

- Slides and course content have evolved over many years, with contributions from:
  - Deborah Estrin
  - Ramesh Govindan
  - Christos Papadopoulos
  - John Heidemann

Brief Unix Demo

- Logging in to aludra/nunki
  - SSH from a console (make sure to use `"ssh -X -Y ..."`)
  - On Windows, use Xwin, Cygwin or PuTTY
    - Ubuntu (Linux)
- Transferring Files
  - SCP from a console
  - SFTP/SCP programs
    - Cyberduck, Fugu, etc. (Mac)
    - FileZilla, WinSCP, etc. (Windows)
- Text Editors
  - `emacs`, `pico`, `vi`
- Compiler
  - `g++ --version`