ICS第一次小班课
9.24

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本节课安排

- 自我介绍
- 课程介绍
- 小班课安排
- Lab介绍
- 一些或许用得上的小知识
- 【maybe】周三课（bits and bytes）回课
- 几道题目

自我介绍

- 姓名/年级/院系
- 爱好/特长
- 北大最喜欢的食堂和菜
- 平时最喜欢的运动/书/游戏/动漫
- 分享一件在场其他人都不知道的事情
- 对ICS有什么期待/担心
- >= 3 min

课程概要

- 课程特点：
  - 内容极多，要求程度高
  - 考试灵活，难度极大（自行查阅往年题、树洞搜索ICS统分洞）
  - 8个lab，极为耗时
- 学习建议：
  - 最好能提前预习（否则上课也许会听不懂）
  - 一定要做好课后复习，复习结合课本和PPT，课本一定要读一遍
  - 不明白的地方动手实践
  - lab尽量早开始做
  - 考前一定要安排好复习时间
  - 对往年题的利用：小班上会做较早年份的往年题，近几年的建议自己留作限时模拟

- http://www.cs.cmu.edu/~213/personal.html
- ## Our Concern for You

  Carnegie Mellon is known for its stressful environment, and we realize that the pace and expectations of 213/513/613 can contribute to that stress. If you find yourself having trouble keeping up, please realize the following:

  - **It's Only a Class.** Your life and personal welfare are more important than your performance in this or any course.
  - **Manage your Time Wisely.** Students struggling in 213/513/613 often follow a pattern where they fall behind and then try to catch up with a marathon effort just before an assignment is due. Instead, they start having health problems, skip or fall asleep in lectures, do poorly in this and other classes, and fall further behind. The key is to never fall behind in the first place. When an assignment goes out that is due on 2 weeks, that's because we expect it to require 2 weeks of concentrated effort to complete.
  - **Take Care of Yourself.** Do your best to maintain a healthy lifestyle this semester by eating well, exercising, avoiding drugs and alcohol, getting enough sleep and taking some time to relax. This will help you achieve your goals and cope with stress.
  - **Don't Resort to Cheating.** As a deadline draws near and you aren't making progress, it can become very tempting to start searching the Web or asking your friends for help. **Don't do it!** If you get caught, the consquences will be much worse than not doing the assignment at all. If you don't get caught, you will still do permanent damage to your own sense of personal integrity, your own learning, and the ability of others to put their trust in you.
  - **It's OK to Ask for Help.** Some students believe that asking for help makes them look bad in the eyes of the instructor, or that it demonstrates they shouldn't be in the course in the first place. We want you to succeed, and we want to help! If you've thought about an issue and are stuck, spending a few minutes with one of the teaching staff may save you hours of frustration.
  - **You are Not Alone.** All of us benefit from support during times of struggle. There are many helpful resources available on campus and in Pittsburgh. An important part of the college experience is learning how to ask for help. Asking for support sooner rather than later is often helpful.

- http://www.cs.cmu.edu/~213/personal.html
- ## Some Resources

  If you or anyone you know experiences any academic stress, difficult life events, or feelings of anxiety or depression, we strongly encourage you to seek support. Here are some possibilities:

  - Counseling and Psychological Services (CaPS). Call 412-268-2922 or visit their website.
  - Consider reaching out to a friend, faculty or family member you trust for help getting connected to the support that can help.
  - If you or someone you know is feeling suicidal or in danger of self-harm, call someone immediately, day or night
    - CaPS: 412-268-2922
    - Re:solve Crisis Network: 888-796-8226
    - Police (On campus: 412-268-2323. Off campus: 911.)

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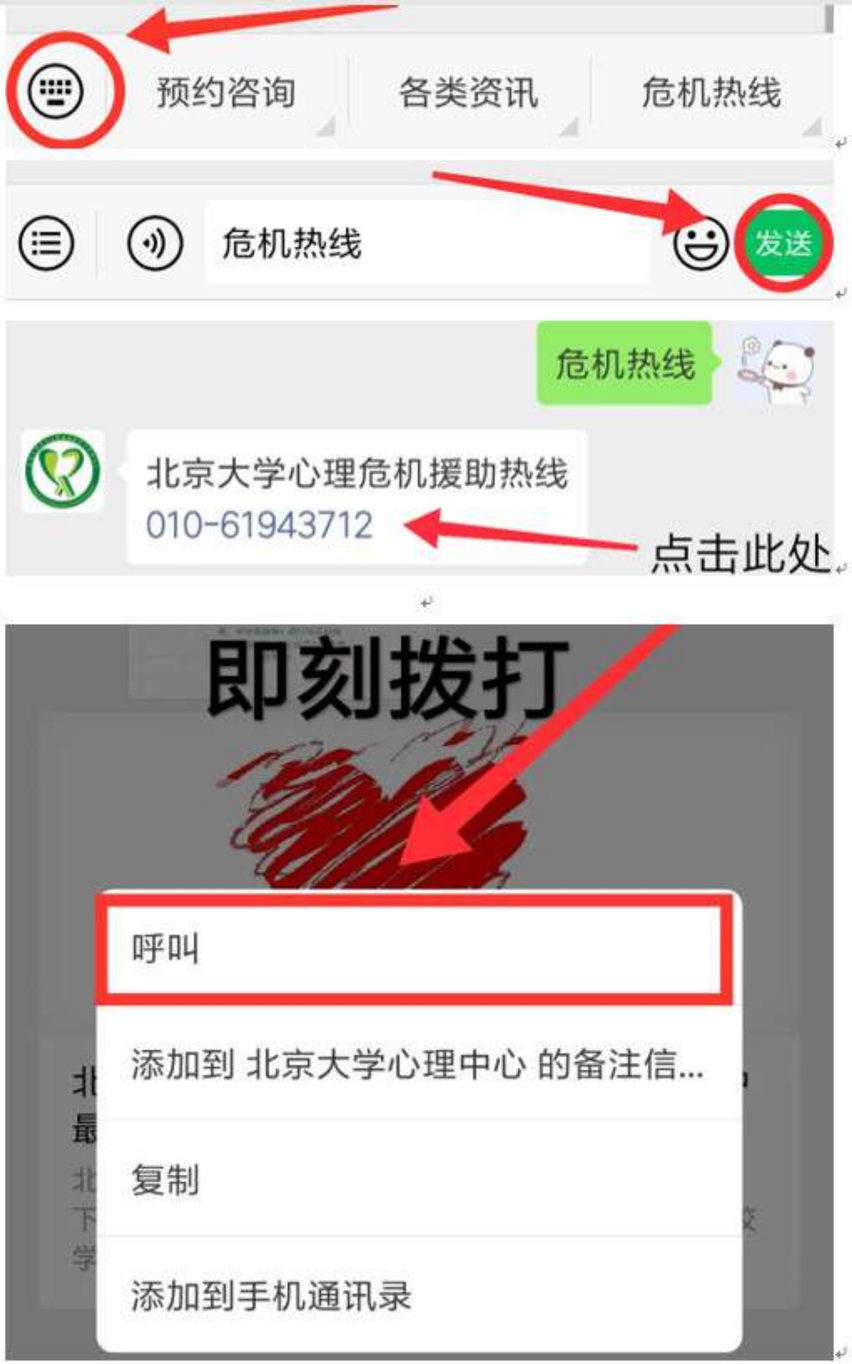

点击右下“键盘（红圈内标志）”，输入“危机热线”，即刻拨打

小班课安排

- 回顾大班课的内容
  - 每次两位同学，每位同学15-20 min
  - 尽量不原文原图摘抄，用自己的语言/图表转述（费曼学习法）
  - 可以加入一点扩展内容
- 回顾Lab（Lab due后的小班课）
  - 15-20 min
  - Lab的整体思路，编程上要注意的细节，自己遇到的坑……
- 讲评作业（TA）
- 期中、期末复习
  - 15-20 min
  - 纲要，重点，结合往年题认为会考的内容

回课安排

- 当周三的课是否周四回？
- 25次回课
- 8个lab
- 1次期中复习
- 1次期末复习（两人）
- 9位同学，每人选4次
- 小班回课安排表 https://docs.qq.com/sheet/DQUNjT01VcWxBb29F

- 26次回课
- 8个lab
- 1次期中复习
- 1次期末复习

周次	小班	大班	大班日期	大班课主要内容	实习题 LAB
一、	(1) *	1.	9.21	Overview	
		2.	9.23	Bits and Bytes/Integers	L1 (datalab) out
二、		3.	9.28	Floating Point	
		4.	9.30	Machine Prog: Basics	L1 due
三、			10.05	*国庆节放假*	
			10.07	*国庆节放假*	
四、	(2)	5.	10.12	Machine Prog: Control	L2 (bomblab) out
		6.	10.14	Machine Prog: Procedures	
五、	(3) *	7.	10.19	Machine Prog: Data	L2 due
		8.	10.21	Machine Prog: Advanced	L3(attacklab) out
六、	(4)	9.	10.26	Processor Arch: ISA&Logic	L3 due
		10.	10.28	Processor Arch: Sequential	L4 (archlab) out
七、	(5)	11.	11.02	Processor Arch: Pipelined	
		12.	11.04	Program optimization	
八、	(6)	13.	11.09	The Memory Hierarchy	L4 due
		14.	11.11	Cache Memories	L5 (cachelab) out
九、	(7) *	15.	11.16	期中考试	
		16.	11.18	Advanced Technologies	专题讲座
十、	(8)	17.	11.23	Linking	L5 due
		18.	11.25	ECF: Exceptions & Processes	
十一、	(9)	19.	11.30	ECF: Signals & Nonlocal Jumps	L6 (tshlab) out
		20.	12.02	System Level I/O	
十二、	(10)*	21.	12.07	Virtual Memory: Concepts	
		22.	12.09	Virtual Memory: Systems	L6 due
十三、	(11)	23.	12.14	Dynamic Memory Allocation	L7(malloclab) out
		24.	12.16	Network Programming I	
十四、	(12)	25.	12.21	Network Programming II	
		26.	12.23	Network Programming III	L7 due
十五、	(13)*	27.	12.28	Concurrent Programming	L8 (proxylab) out
		28.	12.30	Synchronization: Basic	
十六、	(14)	29.	01.04	Synchronization: Advanced	L8 due
		30.	01.06	期末复习要点讲解和答疑	
			01.11	期末考试（下午）	

Lab

- 8个lab，难度各异（每个3分，共24分）
- 实践课上所学内容
- 不要抄袭别人的代码（同届/往届），讨论的时候**high level**!
- 基于Linux操作系统
- 在linux上解压

		关键课件内容	handout	duetime	graceday
L1	datalab	第2节课：Bits and bytes/Integer	9月23日	+12d	2d
L2	bomblab	第5节课：Machine prog: control	10月12日	+12d	2d
L3	attacklab	第8节课：Machine prog: Advanced	10月21日	+12d	2d
L4	archlab	第10节课：Processor arch: sequential	10月28日	+12d	2d
L5	cahcelab	第14节课：Cache memories	11月11日	+12d	2d
L6	tshlab	第19节课：ECF: signals & nonlocal jumps	11月30日	+12d	2d
L7	malloclab	第23节课：Dynamic memory allocation	12月14日	+12d	2d
L8	proxylab	第26节课：Network programming III	12月23日	+12d	0d

也许时间不太对

Quiz

- 本学期安排4个lab相关的小测验，共16分（实际分数可能调整）
- 小测验
  - 内容：Linux与Lab相关内容，与书本内容不重合。具体范围还未定。
  - 题型：以选择题为主
  - 方式：第一节课开始，10-15分钟，闭卷考试

	时间	Lab范围	Tools范围
quiz1	第5周小班课：10月22日	L1/L2	make, vim
quiz2	第9周小班课：11月19日	L3/L4	gdb, binutils
quiz3	第12周小班课：12月10日	L5/L6	git, apt
quiz4	第15周小班课：12月31日	L7/L8	待定

书面作业

- 提交时间：布置作业的下一周周三晚23:59之前
- 提交方式：ics2029@163.com；标题：第几次作业+姓名

关于Linux的一些知识

Linux虚拟机

- Ubuntu 18.04
- VMware（software.pku.edu.cn有正版）或Virtual Box，大信科公众号有推送，可以搜索一下
- VMware Tools实现文件传输/共享文件夹
- vscode有ssh插件，可以用本机vscode写虚拟机里的代码
- 安装：sudo apt-get install xxx
  - sudo apt-get install gcc
  - sudo apt-get install vim

Unix/Linux Command Reference

FOSSwire.com

File Commands

ls – directory listing
ls -al – formatted listing with hidden files
cd *dir* – change directory to *dir*
cd – change to home
cd - – change back to previous directory
pwd – show current directory
mkdir *dir* – create a directory *dir*
rm *file* – delete *file*
rm -r *dir* – delete directory *dir*
rm -f *file* – force remove *file*
rm -rf *dir* – force remove directory *dir* *
cp *file1 file2* – copy *file1* to *file2*
cp -r *dir1 dir2* – copy *dir1* to *dir2*; create *dir2* if it doesn't exist
mv *file1 file2* – rename or move *file1* to *file2*
if *file2* is an existing directory, moves *file1* into directory *file2*
ln -s *file link* – create symbolic link *link* to *file*
touch *file* – create or update *file*
cat > *file* – places standard input into *file*
more *file* – output the contents of *file*
head *file* – output the first 10 lines of *file*
tail *file* – output the last 10 lines of *file*
tail -f *file* – output the contents of *file* as it grows, starting with the last 10 lines

Process Management

System Info

date – show the current date and time
cal – show this month's calendar
uptime – show current uptime
w – display who is online
whoami – who you are logged in as
finger *user* – display information about *user*
uname -a – show kernel information
cat /proc/cpuinfo – cpu information
cat /proc/meminfo – memory information
man *command* – show the manual for *command*
df – show disk usage
du – show directory space usage
free – show memory and swap usage
whereis *app* – show possible locations of *app*
which *app* – show which *app* will be run by default
type *app* – show which *app* or builtin will be run

Compression

tar cf *file.tar files* – create a tar named *file.tar* containing *files*
tar xf *file.tar* – extract the files from *file.tar*
tar czf *file.tar.gz files* – create a tar with Gzip compression
tar xzf *file.tar.gz* – extract a tar using Gzip
tar cjf *file.tar.bz2* – create a tar with Bzip2 compression

Process Management

ps – display your currently active processes
top – display all running processes
kill *pid* – kill process id *pid*
killall *proc* – kill all processes named *proc* *
jobs – lists stopped or background jobs
bg – resume a stopped job in the background
fg – brings the most recent job to foreground
fg *n* – brings job *n* to the foreground

File Permissions

chmod *octal file* – change the permissions of *file* to *octal*, which can be found separately for user, group, and world by adding:

- 4 – read (r)
- 2 – write (w)
- 1 – execute (x)

Examples:
chmod 777 – read, write, execute for all
chmod 755 – rwx for owner, rx for group and world
For more options, see **man chmod**.

SSH

ssh [-p *port*] *user@host* – connect to *host* as *user*, optionally on custom port *port*
scp [-P *port*] *user@host:path1 path2* – copy the remote file at *path1* to local location *path2*
ssh-copy-id *user@host* – add your key to *host* for *user* to enable a keyed or passwordless login

Searching

grep *pattern files* – search for *pattern* in *files*
grep -r *pattern dir* – search for *pattern* in *dir*
command* | grep *pattern – search for *pattern* in the output of *command*
locate *file* – find all instances of *file*

Compression

tar xjf *file.tar.bz2* – extract a tar using Bzip2
gzip *file* – compresses *file* and renames it to *file.gz*
gzip -d *file.gz* – expands *file.gz* back to *file*

Network

ping *host* – ping *host* and output results
whois *domain* – get whois information for *domain*
dig *domain* – get DNS information for *domain*
dig -x *host* – reverse lookup *host*
wget *file* – download *file*
wget -c *file* – continue a stopped download

Installation

Install from source:
./configure
make
make install
dpkg -i *pkg.deb* – install a package (Debian)
rpm -Uvh *pkg.rpm* – install a package (RPM)

Shortcuts

Ctrl+C – halts the current command
Ctrl+Z – stops the current command, resume with **fg** in the foreground or **bg** in the background
Ctrl+D – log out of current session, similar to **exit**
Ctrl+W – erases one word in the current line
Ctrl+U – erases the whole line
Ctrl+R – type to bring up a recent command
!! - repeats the last command
exit – log out of current session

* use with extreme caution.

Vim快速入门

- vim filename 打开文件
- 按i进入编辑模式
- 像一个正常文本编辑器一样使用
- 按esc回到普通模式
- :q 推出，:w保存，:wq保存并推出，:q!不保存直接推出

回课

几道题目（如果还有时间）

一些重要内容

- 小端法：低字节在前。通常内存是按字节从左往右写的，而整数（2字节，4字节，8字节）是最低位在右面。
- 补码表示：
  - $-x = \sim x + 1$
  - 最小值1...0，$x = -2^{w-1}$，$-x = x$
  - 二进制全1，$x = -1$
- 右移和扩展注意算术右移和有符号扩展
- U和T截断、加法、乘法（结果截断后）的位级运算等价
- 整数除法向0舍入，右移向下舍入

C语言中

- integer promotion：如果int够用就转int，否则unsigned int。（即使是short也会转int，因为32位运算快）
- 大小、符号都要变的话，先变大小
- a-bu，是signed和unsigned做二元减法，unsigned
- -bu，是一个unsigned做一元减法，**unsigned**
- `-INT_MAX`当作常量表达式，先常量，再一元减运算符（见上）

1

6. 选择题：下列程序的输出**最接近**_____

```
int main() {
    double pi = 0;
    int k;
    for(k = 0; k >= 0; k++)
        pi += (k & 1 ? -1 : 1) / (double)(2 * k + 1);
    pi *= 4;
    printf("%f\n", pi);
}
```

A. 0　　B. π/2　　C. π　　D. 2π

已知：$1-\frac{1}{3}+\frac{1}{5}-\frac{1}{7}+\cdots=\frac{\pi}{4}$.

2

2、假设下列 int 和 unsigned 数均为 32 位，

int x = 0x80000000;

unsigned y = 0x00000001;

int z = 0x80000001;

以下表达式正确的是（　　）

A. $(-x) < 0$

B. $(-1) > y$

C. $(z<<3) == (z*8)$

D. $y*24 == z<<5 - z<<3$

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答案:ABCD；考虑到运算符的优先顺序，选 ABC 也算对

A. int 中 0x80000000 的相反数还是自己

B. signed (-1) 和 unsinged y 比较，都按照 unsigned，所以强制类型转换后 （-1）很大

C: unsigned, signed 左移三位 = *8

D：应该是相等关系；signed 左移之后，和 unsigned y*24 相比都看成 unsigned

3

1）判断下表中每一行表达式对或错。如果错，请举出反例或简要说明原因（每行 1 分）

int *x*, *y*;

unsigned *u*, *v*;

	True or false	原因或举出反例
if *x*<0, then *x**2 <0		
u<= -1		
if *x*> *y*, then -*x* < -*y*		
if *u*> *v*, then -*u* > -*v*		

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答案

	True or false	原因或举出反例
if *x*<0, then *x**2 <0	F	X= -2^w-1
u<= -1	T	-1 作为无符号来比大于 u
if *x*> *y*, then -*x* < -*y*	F	X=0, y= -2^w-1
if *u*> *v*, then -*u* > -*v*	F	U=2, v=1

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-2^{w-1}

Thanks