

460 Course Plan

CPTS 460 COURSE PLAN
Fall, 2016

TITLE : Operating Systems and Computer Architecture

TEXT (REQUIRED): Design and Implementation of the MTX Operating System,
K.C. Wang, Springer International AG, 2015

ASSIGNMENTS: This website and samples/ directory.

INSTRUCTOR : K. C. Wang, Professor of EECS, Sloan 321;
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Office Hours: MW 3-4 PM

TA : TO BE ANNOUNCED

TOPICS COVERED:

1. Introduction to Operating Systems:
Unix/Linux, MTX. computer system and operations, system development software, PC emulators, link C and assembly programs.
2. Booting: Develop booters for Linux and MTX.
3. Processes:
Concept and implementation of processes; process states, context switching, process scheduling.
4. Process management in Unix:
fork, wait, exit, exec, signals, pipes.
Processes in Minix:
Tasks, servers and user processes in Minix;
5. Process Synchronization:
The process model; mutual exclusion and critical regions, Implementation of low-level mutual exclusion primitives. Synchronization primitives; events, event queues, semaphores.
6. Process Communication:
High-level process synchronization constructs; messages.
7. Process Control:
Scheduling algorithms. Dead lock and starvation problems.
8. Memory Management:
Memory management schemes
Virtual memory and demand-paging
9. I/O drivers:
Serial and parallel ports, interrupt handlers.
Interaction between interrupt handler and process.
Design and implementation of I/O drivers;
I/O routines approach, I/O task approach.
I/O tasks in Minix;

10. File Systems:
 Review of EXT2 file system.
 NFS and RFS based on UDP and TCP/IP

ASSIGNMENTS and REQUIREMENTS

1. 2 Exams: 50%
2. Programming assignments : 50%

```
*****
*                                     *
*           Grading POLICY :         *
*                                     *
*****
```

1. All Assignments are INDEPENDENT WORK !! Absosulely no COPYING!!
2. Oral Quizz will be given during demo of your work.

SYSTEM SOFTWARE:

1. Website: <http://www.eecs.wsu.edu/~cs460/samples> Directory:
 Sample Lab Assignments Solutions
2. Computers:
 Your laptops running Linux or equivalent.

===== DO THESE in week 1 =====

3. Development Software:

www.eecs.wsu.edu/~cs460/samples/ contains

Dev86bin.tar.gz : 16-bit BCC development package

Download to your Linux / directory.

Run `zcat FILENAME.tar.gz | tar xvf -`

to install BCC. Read man pages of bcc, as86 and ld86 to see how to use them.

4. Get QEMU: Ubuntu: `apt-get install qemu-system-i386`

5. ===== DEMO OS MTX of KCW =====
 MTX is a Unix-like OS designed and written entirely by KCW.
 It can run on either REAL PCs or Virtual Machines. Get runnable MTX images at

```
http://www.eecs.wsu.edu/~cs460/samples/vdisk    # HARD  disk image
http://www.eecs.wsu.edu/~cs460/samples/mtximage # FLOPPY disk image
```

- (1). Run QEMU on vdisk:

```
qemu -hda vdisk -smp 8 -m 512m -serial mon:stdio
```

Then boot up MTX from partitions

- 1 (rmtx): MTX in 16-bit real mode
- 2 (pmtx): MTX in 32-bit protected mode
- 3 (smp) : SMP MTX in 32-bit protected mode
- 4 (mtx32.1): MTX in 32-bit mode using segmentation

(2). When MTX starts, login as root

login: root

password: 12345

(3). Enter commands for sh to execute, just like in Unix/Linux

(4). Run QEMU on FD image:

qemu -fda mtximage -no-fd-boochk -serial mon:stdio

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