Nachos Overview
Project 1 - Thread Management

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Outline

- Introduction of Nachos
- Installation of Nachos
- Project 1 – Thread Management
- Tips for Nachos

Introduction of Nachos

What Is Nachos?

- Designed by Thomas Anderson at UC Berkeley in 1992
  - written in C++, but has rewritten Nachos in JAVA
- We use the **C++** version here
- Educational OS that some components can be implemented by users
  - **Process management**
  - **CPU scheduling**
  - **Memory management**
  - File system management
  - Networking

What Is Nachos? Cont.

- Nachos is just a UNIX process runs on real OS
  - simulator makes debug easier and **safer**
- Nachos use simple MIPS R2/3000 instructions
  - turn program to MIPS binary code

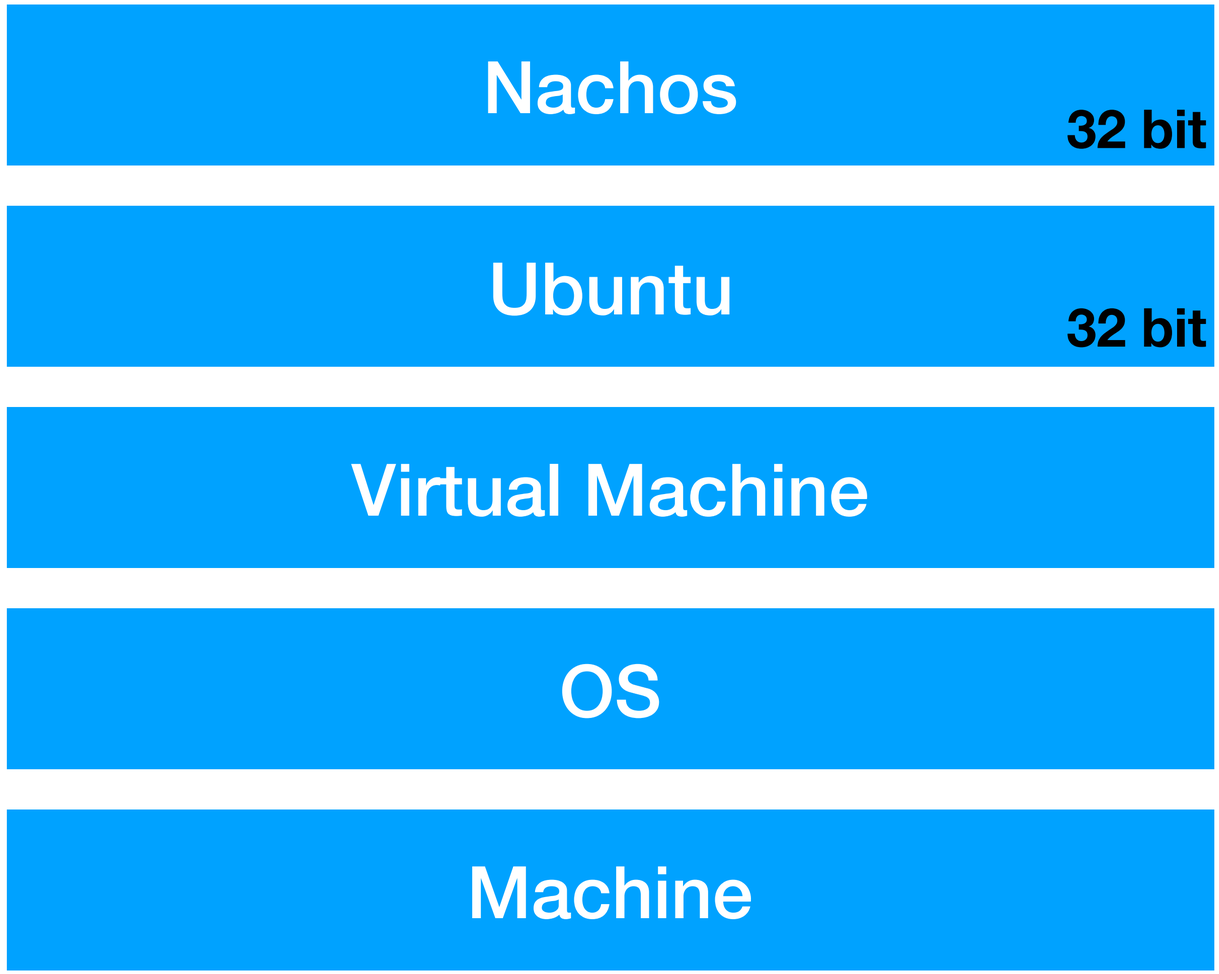
Installation of Nachos

Linux only …

Linux Machine Only

- Theoretically, You can use any Linux distribution as your platform
  - Ubuntu, Fedora, Debian…
  - Remember to use 32-bit instead of 64-bit
    - Nachos4.0 said to support 64-bits but not been completely tested
- Recommended choice
  - 32-bit Ubuntu 14.04 or older version

Structure



Get Ready

- run virtual machine on your machine
  - virtual box, vmware...
- install Ubuntu Desktop 14.04 LTS 32-bit
  - https://www.ubuntutw.org/modules/tinyd0/
- install Nachos and its packages
  - http://cc.ee.ntu.edu.tw/~farn/courses/OS/OS2018/index.htm

```
1  # Install g++ and csh
2  sudo apt-get install csh
3  sudo apt-get install g++
4  # Untar packages
5  tar –zxvf nachos-4.0.tar
6  mv mips-x86.linux-xgcc.tar /
7  tar –zxvf /mips-x86.linux-xgcc.tar
8  # Move to folder and make
9  cd ~/nachos-4.0/code
10 make
```

Project 1

Thread Management

Kickstart

- execute 2 test file in /userprog
  - result should be like this
- if the code work fine, we can move on

```
cd ./nachos-4.0/code/userprog
./nachos -e ../test/test1
# Print integer:9
# Print integer:8
# Print integer:7
# Print integer:6
./nachos -e ../test/test2
# Print integer:20
# Print integer:21
# Print integer:22
# Print integer:23
# Print integer:24
# Print integer:25
```

Project 1

- The result is wrong
- We are going to fix it

```
./nachos -e ../test/test1 -e ../test/test2
# Print integer:9
# Print integer:8
# Print integer:7
# Print integer:20
# Print integer:21
# Print integer:22
# Print integer:23
# Print integer:24
# Print integer:6
# Print integer:7
```

Trace Code and Fix the Issue

- Trace the following files and find out why the result is wrong
  - nachos-4.0/code/userprog/addrspace.h
  - **nachos-4.0/code/userprog/addrspace.cc**
  - nachos-4.0/code/userprog/userkernel.cc
  - nachos-4.0/code/machine/translate.h
  - nachos-4.0/code/machine/translate.cc
- After you fix the bug, recompile Nachos and see if the result is correct
- (Optional)Design your own test program and see what's the difference.
  - Tell us anything interesting you find by your report.

Format of Source Code & Report

- Report
  - Why the result is not congruent with expected
  - The plan you take to fix the problem in Nachos
  - How you really modified Nachos, including some (not all) important code segments and comments
  - Experiment result and some analysis
- Please saved as [Student ID]_report.pdf
  - E.g. r04921119_report.pdf

Code and Report

- Upload to CEIBA
  - Do not mail me the homework please
- Source code and report BOTH
  - create a folder and follow the structure below

    /r04921119_Nachos1

    |___ /nachos-4.0

    |___ r04921119_report.pdf
  - tar zcvf r04921119_Nachos1.tar.gz ./r04921119_Nachos1