Nachos Overview
Project 1 - Thread Management

Outline

- Introduction of Nachos
- Installation of Nachos
- Project 1 - Thread Management
- Submission
- Grading policy

What is Nachos?

- Not Another Completely Heuristic Operating System
- Designed by Thomas Anderson at UC Berkeley in 1992
- Written in C++, but Danial Hattena 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
- Nachos is just a UNIX process runs on real OS
- Nachos uses simple MIPS R2/3000 instructions

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-bit but not been completely tested
- Recommended choice
  - 32-bit Ubuntu 14.04

Virtual Machine

- Select your VM
  - VirtualBox, VMWare, …
- Download 32-bit Ubuntu 14.04
  - https://releases.ubuntu.com/14.04/

Installation

- Install g++ and csh
  - sudo apt-get install g++
  - sudo apt-get install csh
- Download Nachos and cross compiler
  - wget -d http://homepage.ntu.edu.tw/~r11921094/mips-decstation.linux-xgcc.gz
  - wget -d http://homepage.ntu.edu.tw/~r11921094/nachos-4.0.tar.gz

Installation

- Untar packages
  - tar -xvf nachos-4.0.tar.gz
- Move mips-decstation.linux-xgcc.gz to root and untar
  - sudo mv mips-decstation.linux-xgcc.gz /
  - cd /
  - sudo tar -zxvf mips-decstation.linux-xgcc.gz
- Make
  - cd ~/nachos-4.0/code
  - make

Test

- cd ./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

Issue

- When executing test1 and test2 simultaneously
- ./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
  - …
- Not the desired result, we need to fix it

Hint

- Trace the following files and think 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

Report

- In your report
  - Why the result is not congruent with expected?
  - How to solve the issue?
    - You can include some code and explain it
  - Experiment result
  - Discussion
    - e.g. the difficulties you encountered
    - e.g. extra observation
  - (optional) Feedback
- Save your report as the format {Student ID}_nachos1_report.pdf
  - e.g. r11223344_nachos1_report.pdf

Submission Format

- Create a folder for the source code and report
  - {Student ID}_nachos1/
    - nachos-4.0/
    - {Student ID}_nachos1_report.pdf
- Submission format: {Student ID}_nachos1.tar.gz
  - e.g. r11223344_nachos1.tar.gz
- Compress your folder
  - tar zcvf {Student ID}_nachos1.tar.gz {Student ID}_nachos1/
- Submit your compressed file to NTU cool
- Deadline: 2022/10/21 23:59

Grading Policy

- Nachos source code (40%)
- Report (40%)
- Correct format (20%)
- No plagiarism

Late Policy

- 10% penalty per day
- Late penalty only holds for a week
  - You will get at most 70% penalty if late submission

Some tips for Nachos

- **Design** before coding
  - Better create your own test program to get the idea
- **Trace** before coding
- **Google** is your best friend

Reference

- General Nachos Documentation
- Nachos wiki