

E6998 - Virtual Machines Projects

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Projects

- **Timeline**

- Proposals due 2/19 in class
 - Be prepared to talk about your project
- Milestone due 3/25 in class
- Final deliverable due 4/29 in class
 - 10 minute presentation
 - Demo

Project Proposal

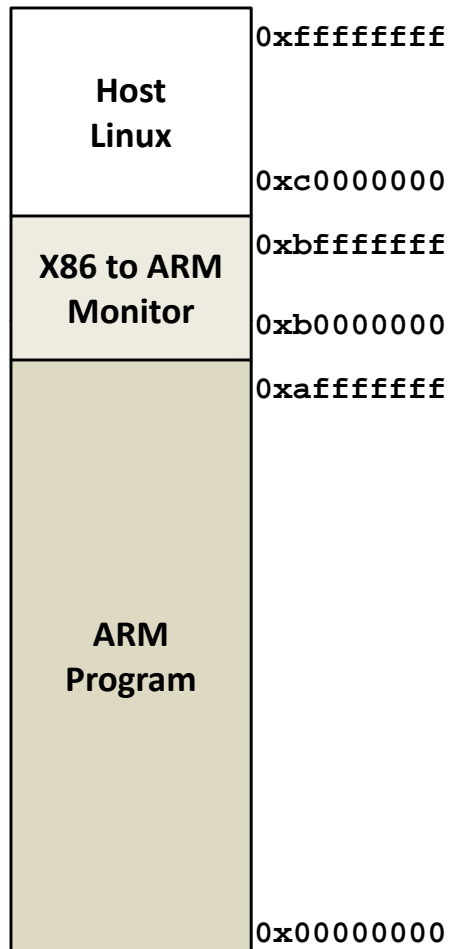
- **Project members**
- **Project description**
 - What is it? Why is it interesting?
- **Initial design**
- **Division of labor**
- **Milestone deliverable**
- **Final deliverable**
 - Results presented
 - Demo

Cross-ISA Binary Translation

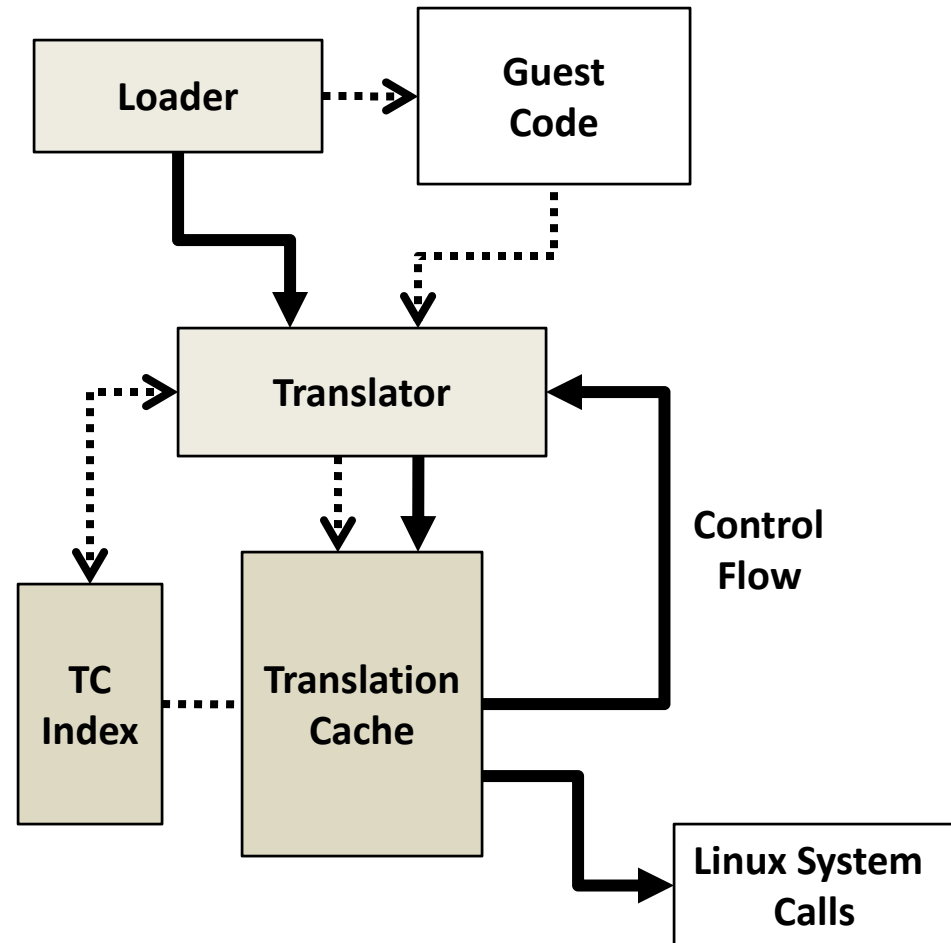
Run ARM based Linux binaries on x86 Linux hosts

- 1. Create x86 monitor program in high user space**
- 2. Monitor loads ARM binary**
- 3. Monitor translates ARM code on-the-fly to x86 code and caches into a translation cache**
- 4. Passes through ARM Linux system calls to host Linux**

Cross-ISA Binary Translator



Address Space



Monitor Block Diagram

Debugger with Single Step Backward

- **Features to support**
 - Single step forward / Single step backward
- **Binary Translator**
 - Records direction of each basic block
 - Keeps instruction count
- **Undoing instructions (1 or 2)**
 1. Create undo translation for each basic block
 - Keep stack of memory accesses
 2. Periodically snapshot memory
 - Rollback to snapshot and play forward (n-1) instructions

Off-Line Web Services

Run web services in a VM for off-line access

1. Setup several web-service VMs

- Wikipedia
- open source map server

2. Proxy detects connection status and selectively redirects web requests

3. When host is off-line power-up VM and redirect requests to it

- VIX API from VMware allows VM management from C, COM, Perl

Virtual Grid Computing

Use VMs to utilize spare CPU cycles

1. Install and setup grid application

- Rendering, folding@home

2. Create a master image

3. Install Vgrid on a set of computers

4. Manage Vgrid VMs from a central process(es)

- Use VIX or VMware SDK to manage VMs
 1. Starts VM
 2. Monitors VMs
 3. Records results

Security Enhanced VMs

Add security enhancements to an existing VMM

- **Encrypted disks**
- **Limited network connections**

Resources

- **VMware**

- VIX API

- <http://www.vmware.com/support/developer/vix-api/>

- VC SDK

- <http://www.vmware.com/support/developer/vc-sdk/>

- **Xen**

- <http://xen.org/>

- **KVM**

- <http://kvm.qumranet.com/kvmwiki>

More Resources

- **Pin**

- <http://rogue.colorado.edu/pin/>

- **QEMU**

- <http://fabrice.bellard.free.fr/qemu/>