

Linux Kernel Programming

**I Will now Talk about Virtualization and Operating Systems
Security for about 15 minutes**

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Outline

- 1 Introduction
- 2 Virtualization
- 3 OS Security
- 4 Small poll

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Introduction

- ▶ We (SSRG) are thinking about proposing one or two courses on systems software concerning:
 - ① **Virtualization**
 - ② **OS Security**
- ▶ We would like to estimate the popularity among the students of these courses if they were to be proposed
- ▶ I will briefly give an overview of each topic
- ▶ Then I will ask you to complete a poll online
 - ▶ Anonymous
 - ▶ Takes 1 minute to complete, just 2 yes/no question

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2 **Virtualization**

3 OS Security

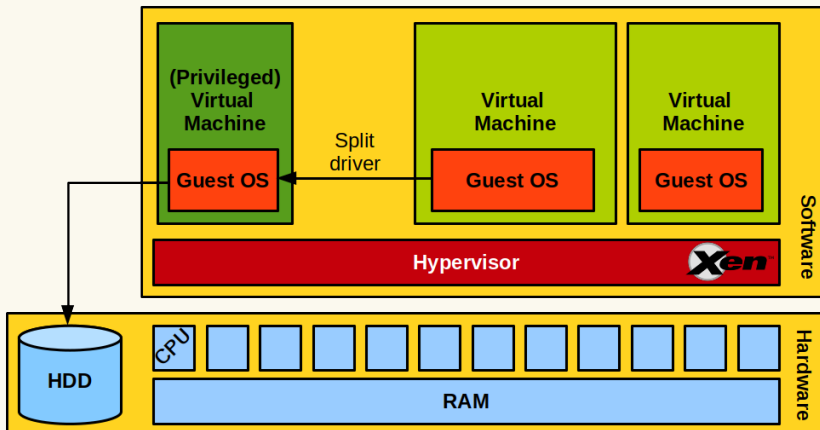
4 Small poll

Virtualization

- ▶ OS **virtualization** consists in running several operating systems on a single physical machine
 - ▶ Virtual machines representing virtual versions of regular physical machines
- ▶ What for?
 - ▶ **Consolidation**
 - ▶ Maximize resource utilisation
 - ▶ Saves money, space, power
 - ▶ Virtualization is one of the pillars powering **cloud computing**
 - ▶ Sharing a single host physical resources
 - ▶ On-demand, elastic resources
 - ▶ **Software development:**
 - ▶ Testing:
 - Emulates hardware environments that are not necessarily physically available
 - Provisions test environments in general
 - ▶ Can significantly speed up development (ex: kernel)
 - ▶ etc.

Virtualization

Example: Xen



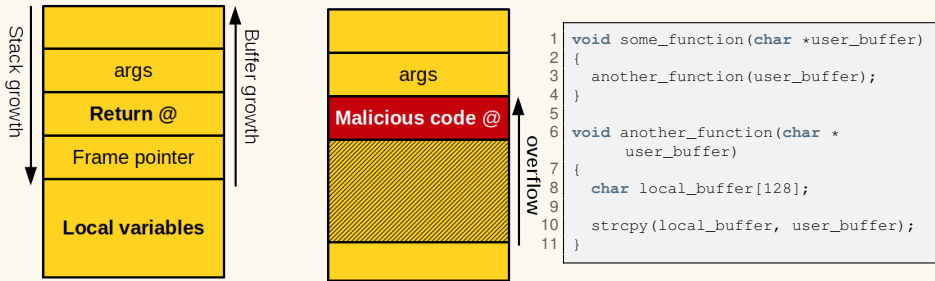
- ▶ Important notions: performance, performance isolation, security
- ▶ Interesting issue: semantic gap

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OS Security

Stack smashing



- ▶ The attacker controls the stack:
 - ▶ Can call functions chains by address, with arbitrary arguments
- ▶ Can jump to injected/existing code
- ▶ Advanced techniques also allows to read/write arbitrary locations in memory

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Small poll

- ▶ Please answer the poll online
- ▶ Questions are:
 - ▶ Would you be interested in a Virtualization course?
 - ▶ Would you be interested in an OS security course?
 - ▶ yes/no
- ▶ You will find a link from the LKP webpage on canvas:

`https://canvas.vt.edu/courses/45565`