CloudSkulk: Design of a Nested Virtual Machine-based RITM Attack

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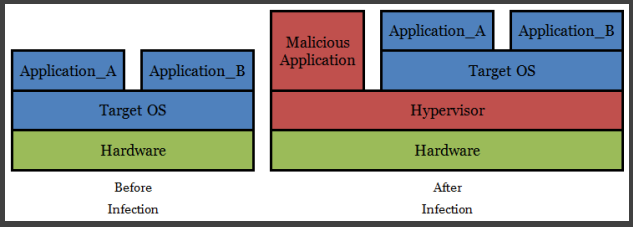
Goal

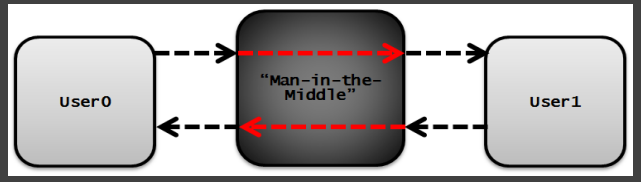
- Introduce a novel software security attack against cloud platform guest-host victim pairs to help aid in advancing cloud system security.

Background

- SubVirt: VM can act like a rootkit = STEALTH!!! (proof of concept)



- BluePill: real world VMM attack implementation project
- Man-in-the-Middle (MITM) attack:
  - relay (passive), alter (active) communication between users



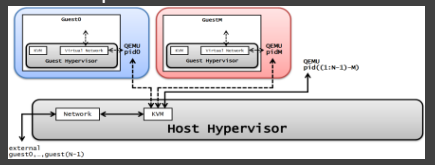
- Full Virtualization: complete sim + hardware, unmodified guest OS
- Live Migration: copy running VM image to another guest

Our Approach

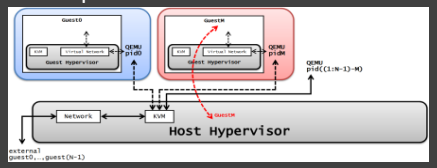
- CloudSkulk: Introduce a new type of Rootkit-in-the-Middle (RITM) attack
  - ❑ VM can act like MITM + rootkit = CLOUD STEALTH!!!
- Exploit IaaS cloud platform QEMU/KVM software infrastructure
  - ❑ Full-Virtualization, Live Migration, Host-Port Forwarding

Implementation

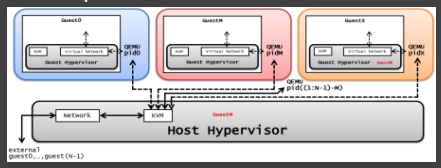
- Step #1: SET-UP



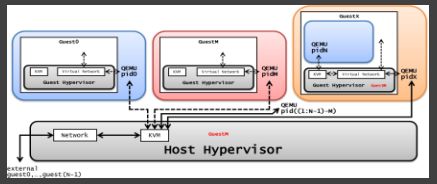
- Step #2: PRIVILEDGES



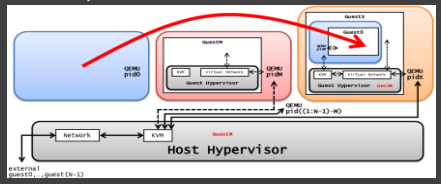
- Step #3: ROOTKIT



- Step #4: NESTING



- Step #5: MIGRATION



Targets

- IaaS Cloud Platform Vendors:
  - ❑ Google Compute Engine, IBM SmartCloud Enterprise,…
- Targeted guest applications or users:
  - ❑ Spotify, Coca-Cola, Motorola, or any normal individual cloud users

Conclusions

- Significantly easier to implement than SubVirt, BluePill
- STEALTH!!! Maintain control for extended periods of time