

# NEMU

The No EMUlation Hypervisor

October 4th, 2018

# NEMU

- **No EMUlation**
- QEMU based
- Exclusively focused on cloud-specific workloads
- Removes all features, platform and hardware emulation not required for the cloud
- Keeps the performance, stability and robustness of QEMU

# NEMU Goals

- Small attack surface (Low complexity, low footprint)
- High performance (Comparable to QEMU)
- No hardware emulation
- UEFI firmware only
- Linux and modern Windows guests only
- x86-64 and aarch64 only
- *Hardware-Reduced* ACPI
- Hotplug: CPU, memory, NVDIMM and PCI

# Initial Proof Of Concept (May 2018)

- pc and q35 (i386), virt (ARM) machine types only
- Semi-manual code removal: features, platforms and virtual devices
- 75% code size reduction
- Binary size reduced from 12.5 MB to 4.3 MB
- Shared libraries reduced from 97 to 29
- Device model reduced from 236 to 66 devices
- Published on GitHub as “[experiment/code-reduction](#)”

# NEMU Status (September 2018)

- New machine type on top of QEMU 3.0.0: ***i386/virt***
- *Hardware-Reduced* ACPI
- UEFI firmware only (OVMF)
- Minimized hardware emulation
- No legacy hardware support
- ACPI-based hotplug
- Integrated and extended CI
- The ***i386/virt*** machine type boots UEFI-based Linux cloud workloads (Clear Linux, Ubuntu Xenial & Bionic)
- The ***i386/virt*** machine type runs Kata Containers
- Published as [“topic/virt-x86”](#)

# NEMU Today (October 2018)

- ARM CI support
- Increased configurability of build:
  - No TCG dependency for ARM virt
  - Able to build without PC/Q35
  - More explicit CONFIG\_ options
  - Ability to build “virt only” binary
- Automated removal scripts publishing automatically from pushes to “topic/virt-x86” branch. Published as “[experiment/automatic-removal](#)”

# QEMU vs NEMU: Code Size<sup>1</sup> Reductions

	<b>QEMU 3.0.0</b>	<b>NEMU</b>	<b>Delta</b>
<b>C</b>	1317932	276410	-79%
<b>C header</b>	257301	68863	-73%
<b>Complexity</b>	148831	42340	-71%

<sup>1</sup> Measurements done with <https://github.com/boyter/scc>

# QEMU vs NEMU: Device Model<sup>1</sup> reduction

	NEMU pc	NEMU virt	Delta
Number of devices	221	45	-79%

	QEMU 3.0.0 pc	NEMU virt	Delta
Number of devices	225	45	-80%

<sup>1</sup> Device model description built from QEMU's `info qdm` command



# Plans

- Upstreaming of *virt* machine type and OVMF support
- Documentation
- CI extensions: More features tested
- Work toward legacy-free PCI

Demos

Questions ?