WIND

Deep Insights:
High Availability VMs via a Simple Host-to-Guest Interface

OpenStack Masakari

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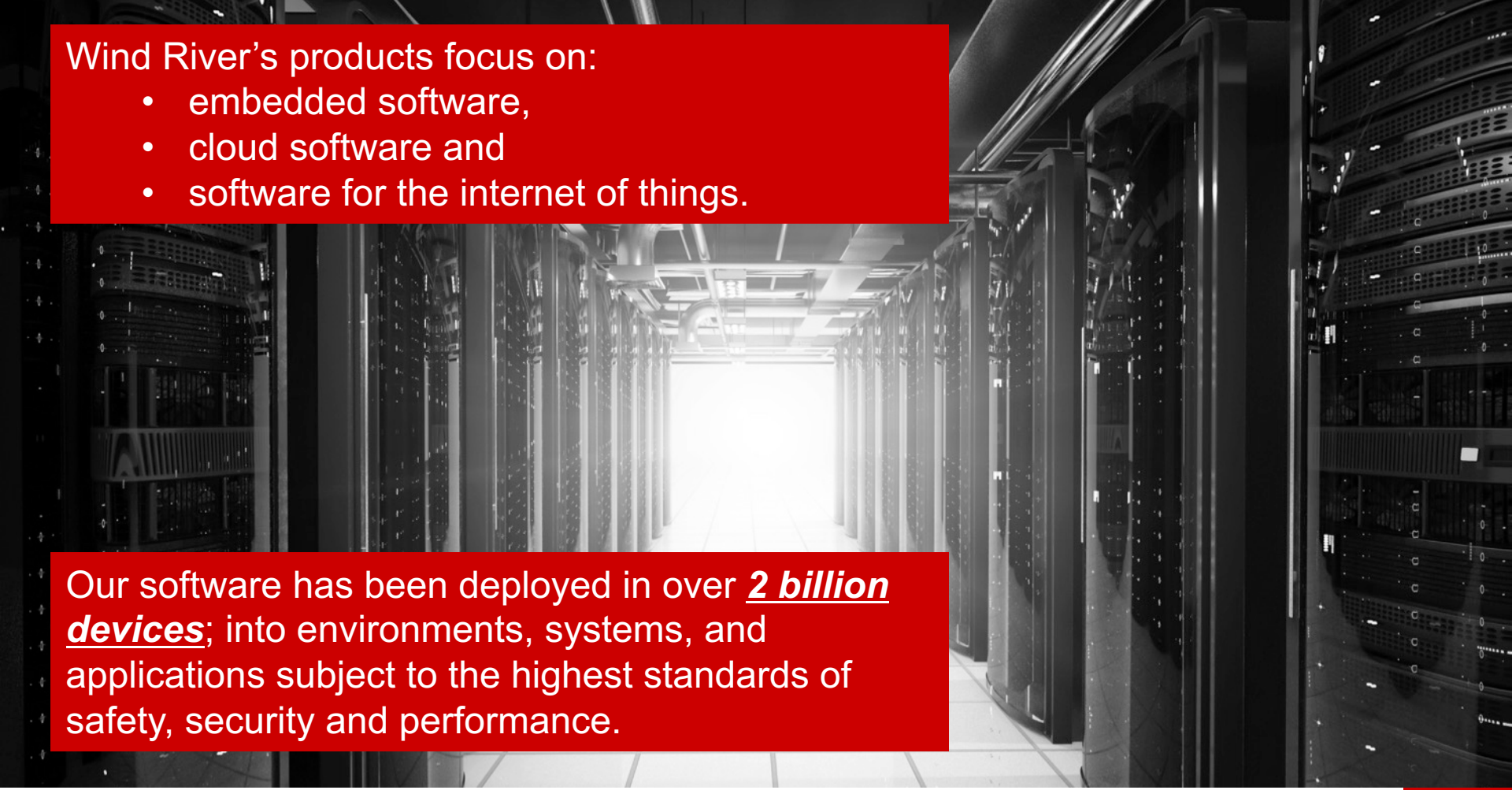
WHEN IT MATTERS,
IT RUNS ON WIND RIVER.



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- embedded software,
- cloud software and
- software for the internet of things.

Our software has been deployed in over ***2 billion devices***; into environments, systems, and applications subject to the highest standards of safety, security and performance.

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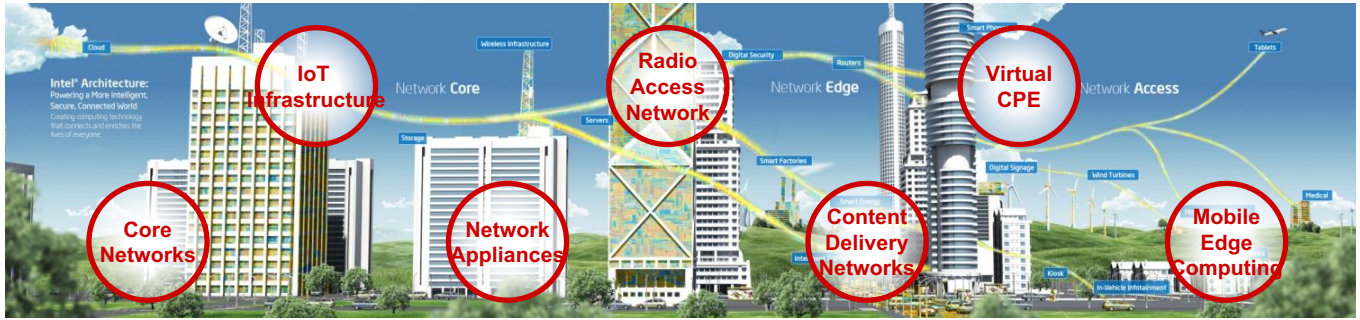
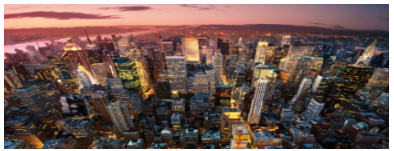
Networking



Energy

Manufacturing

Smart Buildings



Healthcare

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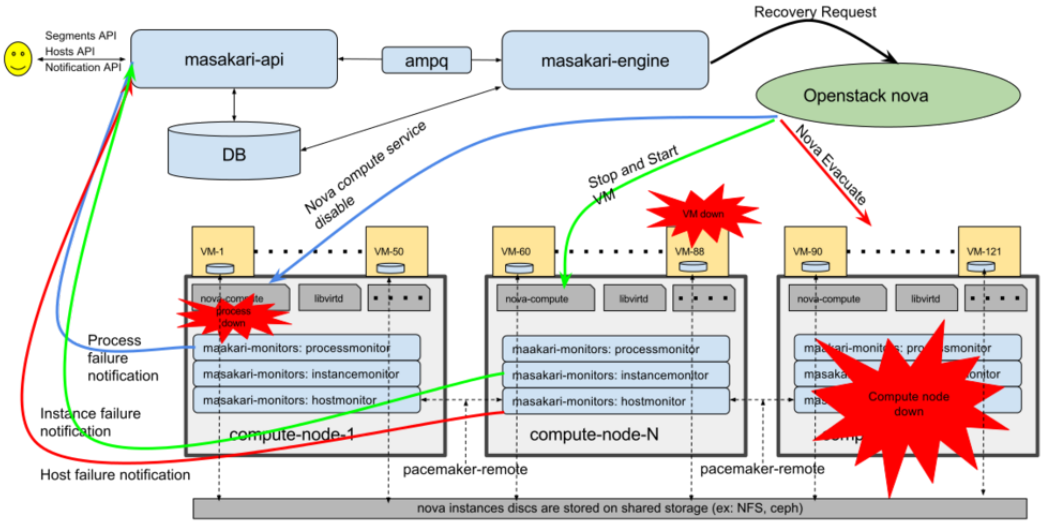
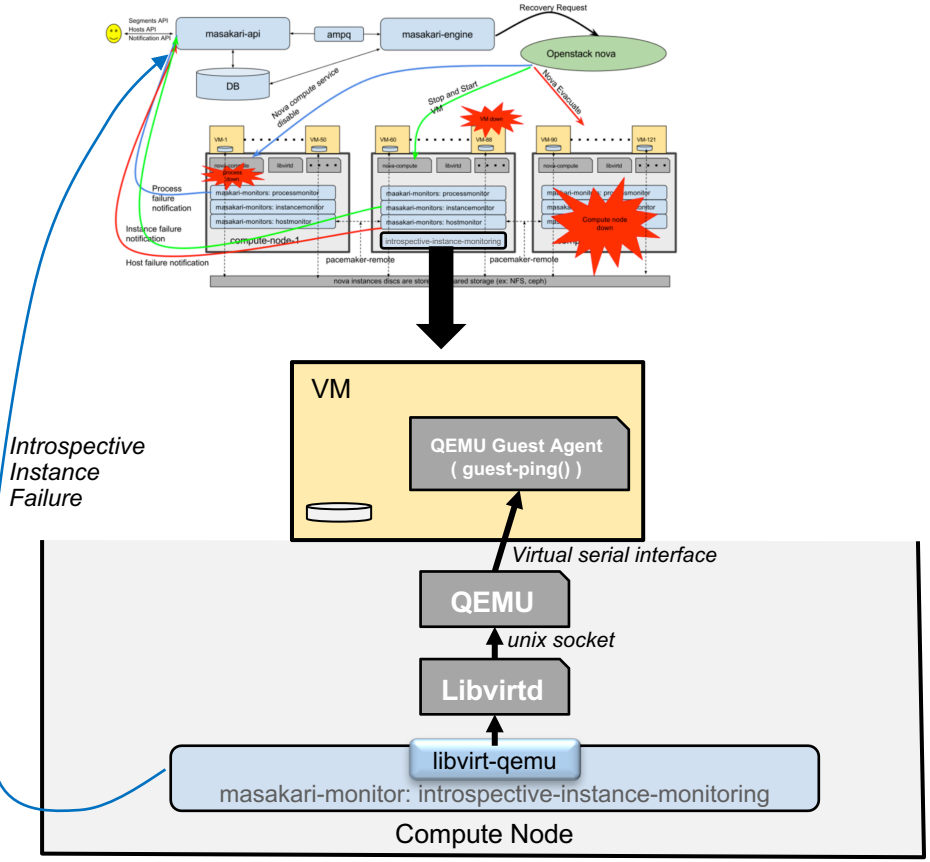
BACKGROUND:

OpenStack Masakari – Virtual Machine High Availability



- Recovering KVM-based VMs from various failure events:
  - KVM Process down,
  - Critical Service Process down,
  - Compute Host failure.
- ‘masakari-monitors’ on Compute Host monitor for failures
  - Reporting failures via ‘masakari-api’ to the ‘masakari-engine’.
- ’masakari-engine’ on Controller Node takes appropriate actions to recover affected VMs.

OpenStack Masakari – Introspective Instance Monitoring *- NEW -*



- ***Existing*** masakari instance-monitor,
  Black Box Monitoring of VM thru LibVirt.
- ***NEW*** masakari ***introspective***-instance-monitor,
  White Box Monitoring of VM thru QEMU Guest Agent.

- **Enables detection of Guest VM Failures that existing Black Box instance-monitor does NOT detect**
- **Simple QEMU Guest Agent guest-ping() can indirectly detect failures** such as:
  - Hung Guest OS,
  - Failure of Guest OS to schedule Application Processes,
  - Failure to route basic IO within the Guest,
  - Severe resource exhaustion, etc. .

- Enabled via Flavor Extra-Spec,
- Leverages open-source Qemu Guest Agent for messaging to/from VM.
  `https://wiki.libvirt.org/page/Qemu_guest_agent`

OpenStack Masakari – Other Introspective Possibilities *- NEXT -*

Other ways to leverage *'reachthru capability inside Guest VM'* ... i.e. Host → Guest APIs
to enable Higher Availability VMs.

- **Graceful Guest Application Handling of VM Operations,**
  - Introduce NOVA PROXY to intercept non-passive VM Operations *(stop/start, reboot, pause/unpause,, resize begin/end, migrate begin/end)* and notify Guest VM Application to "gracefully" prepare for the event.

- **Ability for VM to NACK VM Operation to avoid Application Out-Of-Service Condition,**
  - Introduce NOVA PROXY to intercept non-passive VM Operations *(stop/start, reboot, pause/unpause,, resize begin/end, migrate begin/end)* such that Guest Application can WARN / NACK OpenStack that this would result in Application Out-Of-Service.

- **Lightweight Broadcast Notification and State-Change-Notifications within Nova Server-Group,**
  - Provide Lightweight Broadcast messaging between VMs of the same Nova Server-Group, for purposes of bootstrap communication between VMs prior to even networking within Guest even coming up,
  - Provide VM State Change Notifications to all VMs of the same Nova Server Group, for a potentially faster, more reliable, backup notification path for peer VM failures to Guest Applications.

- **Ability to fully support Dynamic Resource Scaling between NOVA and Guest VMs.**
  - E.g. Ability to notify Guest OS of VM that a new virtual vCPU core was assigned/removed to the VM, in order for the Guest OS to properly online / offline the cpu within the Guest OS.

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