**Muti-Hypervisor Virtual Machines**

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**Hypervisors are Getting Too Big**

**Problem:** Too many services.

- VM Introspection
- Intrusion Detection
- High Availability
- Live Migration
- Live Patching
- File systems etc.

**Solution:** Break Them Up

**Hyperplexor**: Base L0 hypervisor that multiplexes hardware for L1.

**Featurevisors** (F): 3rd-party “Hypervisors” that provide add-on services.

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**Challenge:** Transparent Control of Guest By Multiple Hypervisors

- **Guest Memory**
  - Shared
- **Virtual I/O Devices**
  - Distributed
- **VCPUs**
  - One hypervisor.

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**Demonstration**

- On modified KVM/QEMU platform
- Common benchmarks
- Kernbench, iperf, Quicksort
- 0–15% overhead vs. standard VMs
- Ephemeral Virtualization
- 80ms average switching times.
- Page-fault servicing: 3.6—4.2µs
- Interrupt redirection: 13—41µs

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**Performance**

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