

Quickly Transition to Container-Based Cloud Applications

Intel, Redapt, Supermicro, and Tectonic* by CoreOS help IT teams move from hypervisors to container-based development of cloud applications



Introduction

Microservices—small, independent processes that are focused on an individual task—have traditionally been hosted on hypervisor-based virtual machines. Using container-based microservices in cloud applications is an emerging technique that can improve portability and resource optimization. But moving from traditional hypervisor-hosted application development to container-based application development requires new skills. Several challenges can slow the transition:

- **Complexity.** Managing the volume of containers, as well as their configuration and life cycle, requires careful and complex planning.
- **Security.** Each container shares the same host OS kernel and container execution environment. A security attack has the potential to compromise the underlying OS and affect every container running on it.
- **Scalability.** Scaling containers typically requires a custom container management system or a third-party tool that handles container orchestration, scheduling, and clustering.

Distributed, Container-Based Software Platform for Private, Public, and Hybrid Clouds

The Tectonic* platform combines Kubernetes and the CoreOS software portfolio in an integrated package that makes container-based application development easier and faster.

- **CoreOS.** A lightweight operating system (OS) designed to support distributed computing, with an integrated metadata service for cluster configuration, etcd, and an atomically updated, read-only system image for cluster nodes. User applications on CoreOS nodes are executed only in isolated and, optionally, cryptographically verified containers.
- **Kubernetes.** A Google-led, open source project for application scheduling that allows developers to define microservice deployment architectures that make up applications and services for customers. Building on the etcd metadata service and other system elements, Kubernetes is a framework for orchestrating application containers running on distributed clusters like those CoreOS was designed to construct.

Tectonic includes a management console for simplified cluster orchestration workflows and monitoring dashboards, an integrated container registry to build and distribute Linux* container images, and additional tools to automate deployment and control rolling software updates. Tectonic runs in private or public clouds and is unique in integrating container scheduling and monitoring in a single enterprise package. The platform delivers a solution for businesses that are transitioning to a distributed, container-based infrastructure for private, public, and hybrid cloud computing. Redapt, a leading systems integrator, helps enterprises accelerate their deployment and use the Tectonic platform to develop container-based microservices. Its integration, development, and deployment capabilities allow IT organizations to immediately focus their efforts on developing and delivering cloud-based solutions.

Tectonic allows IT teams to focus on their core competencies:

- **Developers.** Deploy microservice architecture stacks using simple templates that define infrastructure requirements and configurations. Tectonic includes an API and a dashboard, and enables easy deployments and rollbacks, as well as automatic load balancing for services.
- **Operations.** Tectonic offers higher machine utilization, a consistent environment across teams, and clean boundaries between the OS and applications.

Bring Cloud-Aware, Distributed Applications to Market Faster

With Tectonic, developers can immediately begin writing distributed microservice applications using container technology. They can also define infrastructure requirements in the software, and then deploy applications and infrastructure at the same time using the same process. Tectonic gives developers the ability to quickly define, visualize, deploy, and iterate complex container-based microservice architectures.

The benefits include the following:

- **Scalability.** With Kubernetes scheduling and CoreOS partitioning, Tectonic is both scalable and elastic. It allows developers to rapidly deploy microservices.
- **Security.** Tectonic takes advantage of hardware-based security features that provide greater privacy, control, and integrity assurance.¹

- **Cost savings.** The reduction and consolidation of hardware through integrated tools means that fewer suppliers are needed, which saves time and money over the long term.

- **Ease of use.** By integrating current, best-of-breed tools, Tectonic provides a robust, predictable, and repeatable experience. It delivers reliability in all aspects of container-based cloud computing with a minimal number of components and suppliers.

Powered by Intel® Technology

The Tectonic platform is enabled by a variety of Intel technologies for industry-leading performance, security, and reliability.

- **Intel® Xeon® Processor E5 product family**—This product family enables powerful, agile data centers by supporting a software-defined infrastructure (SDI). Intel Xeon processors deliver significant benefits in terms of performance, power efficiency, virtualization, and security. The Intel Xeon Processor E5 product family features Intel® Turbo Boost Technology 2.0, which dynamically increases the processor's frequency as needed, and Intel® Hyper-Threading Technology, which delivers two processing threads per physical core.²
- **Intel® SSD**—Intel solid-state drives are optimized for write-intensive performance with high endurance and strong data protection. This SSD accelerates data center performance with fast read/write throughput speeds and low typical active power, which improves data center efficiency and reduces energy costs.
- **Intel® Ethernet Converged Network Adapters**—Low-power, low-latency Intel® Ethernet Converged Network Adapters address the demanding needs of the next-generation agile data center by providing unmatched features for virtualization, flexibility for LAN and SAN networking, and proven, reliable performance. The Intel Ethernet Converged Network Adapter X710-DA2 features Intel® Ethernet Power Management Technology, which helps reduce idle power and operates at maximum energy efficiency whenever possible, and Intel® Data Direct I/O Technology, which improves I/O data processing efficiency for data delivery and data consumption from I/O devices.

Tectonic* Platform Bill of Materials

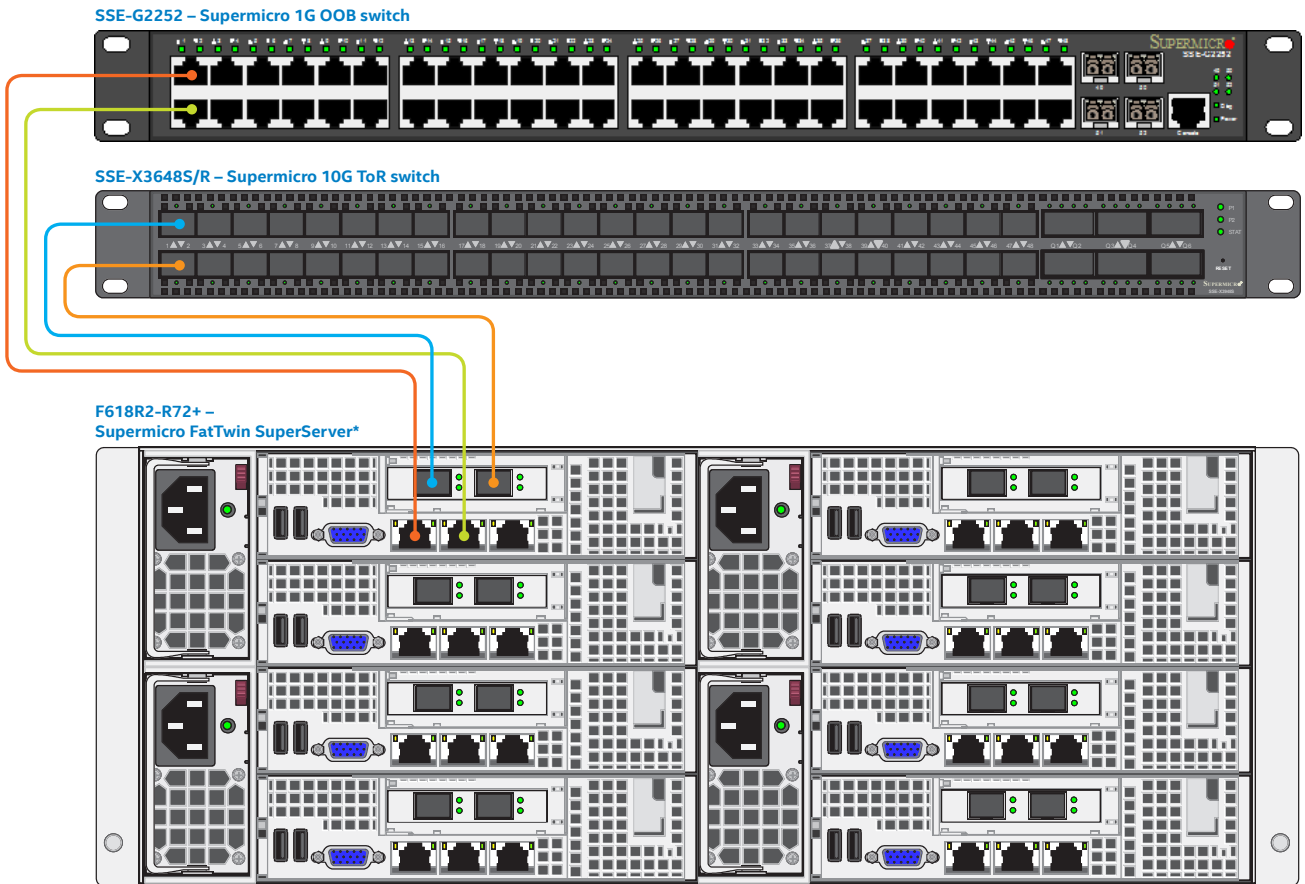
TECTONIC CLUSTER

QTY	PART NUMBER	DESCRIPTION
1		Tectonic* 0.5.0
1		CoreOS* 845.0.0
1		Kubernetes* v1.0.6
1	SSE-X3648S/R	Supermicro 10G ToR switch
1	SSE-G2252	Supermicro 1G OOB switch
16	CBL-0348L	Supermicro SFP+ cable
1	F618R2-R72+	Supermicro FatTwin SuperServer*

NODE SPECIFICATION

QTY	PART NUMBER	DESCRIPTION
2	E5-2680v3	Intel® Xeon® processor E5-2680 v3, cache 30MB, core count 12, clock speed 2.5GHz
8	CT16G4RFD4213	Memory crucial 16GB, registered ECC, 128GB overall
2		Intel® SSD DC S3710 Series 400GB
1	X710-DA2	Intel® Ethernet Converged Network Adapter X710-DA2, 10 Gbit, dual port SFP+TPM

Tectonic Reference Design



Accelerating Innovation through Ecosystem Engagement

Intel works with key ecosystem leaders to bring more cloud-aware applications to market using trusted methods. Together, Intel, Redapt, Supermicro, and Tectonic by CoreOS provide a turnkey container-based solution for application development and deployment. Running on Intel® architecture, the Tectonic platform provides a robust starting point for IT organizations moving to container-based infrastructure, while Redapt helps integrate the platform into the existing data center.

NETWORK CONFIGURATION

ROLE	VLAN id	CIDR
Overlay network	vxlan tunnel VNI = 2	10.5.0.0/16
ipmi network	untagged vlan 3	10.10.3.0/24
ssh+pxe network	untagged vlan 4	10.10.4.0/24
Underlay network	5	10.10.5.0/24
Management network	6	10.10.6.0/24
etcd network	7	10.10.7.0/24
Public network	untagged vlan 10	x.x.x.x/x set by external DHCP

A sample VLAN segmentation shows recommended subnet addressing.

Redapt Manages Deployments from Order to Installation

Redapt's experience in building customer-specific private and hybrid clouds that are optimized for individual workload requirements goes beyond a turnkey appliance. Redapt's Integration Services manages the deployment from order to delivery, partnering with suppliers to ensure accurate lead times, integration coordination, testing, validating, delivery, and installation of custom data center racks. Redapt accelerates cloud and container delivery through carefully designed and executed project phases:

- **Workshops.** Redapt uses cloud workshops to identify workloads; develop network architectures based on security, computing, and storage needs; and tailor ongoing support agreements.
- **Procurement.** Redapt works with suppliers to manage the complex logistics of purchasing and tracking lead times for all hardware and software, and to ensure seamless delivery.
- **Installation.** Redapt installs and configures all aspects of the cloud, including network, storage, compute, and hypervisors.
- **Validation.** After comprehensive on-site training, customers test the installation against workshop requirements.
- **Migration.** Legacy applications are migrated to the new platform.

Redapt is a global systems integrator that delivers innovative data center infrastructure and cloud solutions. Redapt launched its cloud practice in 2009, and today delivers a variety of private, hybrid, and public cloud solutions. Redapt can manage the installation of custom data center racks at scale through its integration facilities around the world.

About Solution Providers

Intel Server Solutions

Intel offers a range of server solutions optimized to fit every data center and workload, from small-business financial data management and high-density microservers to cloud hosting and memory-intensive technical and analytics workloads. Intel has relationships with other leading technology companies to deliver optimized cloud solutions.

CoreOS

CoreOS develops open source projects for Linux containers. Its goal is to enable companies to run applications securely and reliably in any environment. Tectonic by CoreOS was designed to address enterprise requirements and utilizes open-source projects in an opinionated way.

Redapt

Redapt is a leading systems integrator working with Supermicro to implement cloud systems. Redapt helps enterprises accelerate their deployment on the Tectonic platform to develop innovative container-based microservices.

Supermicro

Supermicro is a leading development platform of choice for container development and deployment, with standard server, storage, plus switch solutions, tailor-made for the container virtualization space. Supermicro's FatTwin*, TwinPro*, Blade*, and Ultra* server lines are used by the CoreOS and Kubernetes development teams and deployed at customer sites. Supermicro's switching and storage solutions are specifically designed to accelerate container adoption through technology solutions from industry peers like Intel. Supermicro has joined with cloud technology leaders such as Intel to develop performance enhancement solutions for OpenStack*, Ceph*, and other storage platforms popular in the hyper-scale container virtualization sphere.

To learn more about deploying a single-master/multi-worker Kubernetes cluster on CoreOS and to read instructions for installation, please visit coreos.com/kubernetes/docs/1.0.6/getting-started.html.

For more information on Intel architecture for cloud computing, visit intel.com/xeon

For more information on Intel's cloud computing initiatives, visit intel.com/cloud

For more information on Redapt, visit redapt.com

For more information on Supermicro, visit Supermicro.com

For more information on Tectonic by CoreOS, visit tectonic.com



1. Polvi, Alex, "Tectonic Provides Cryptographic Chain of Trust from Application Layer to Hardware, Turns DRM on its Head." Tectonic, Dec. 2, 2015, tectonic.com/blog/announcing-distributed-trusted-computing/.
2. This feature may not be available on all computing systems. Please check with the system vendor to determine if your system delivers this feature, or reference the system specifications (motherboard, processor, chipset, power supply, HDD, graphics controller, memory, BIOS, drivers, virtual machine monitor-VMM, platform software, and/or operating system) for feature compatibility. Functionality, performance, and other benefits of this feature may vary depending on system configuration.

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