SOLUTION BRIEF

Service Providers
Data Center

Making BMaaS More Efficient and Profitable

Software-defined Infrastructure Based on Intel® Rack Scale Design Enables Service Providers to Streamline Delivery of BMaaS

This solution brief describes how to solve business challenges through investment in innovative technologies.

If you are responsible for...

- **Business strategy:** You will better understand how Bare Metal as-a-Service will enable you to successfully meet your business outcomes.
- **Technology decisions:** You will learn how a Bare Metal as-a-Service solution works to deliver IT and business value.

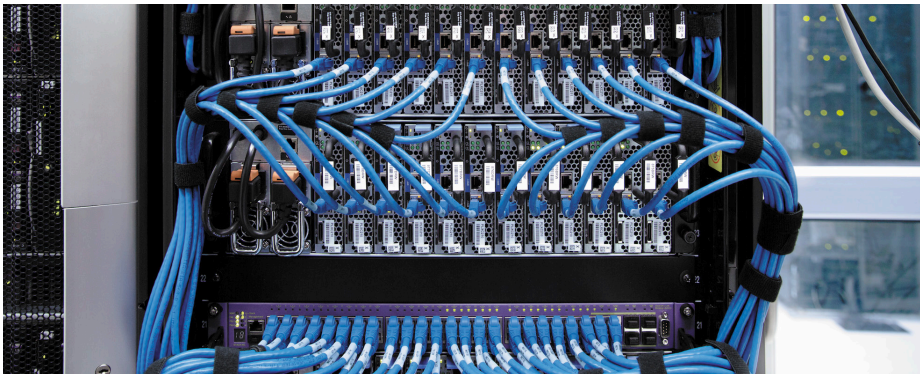
Executive Summary

Enterprise cloud services adoption has skyrocketed in recent years, but some customers still have high expectations when putting performance-intensive workloads or those that must adhere to strict privacy requirements into a virtualized, multi-tenant cloud environment.

For these types of workloads, Bare Metal as-a-Service (BMaaS), which offers a dedicated server environment with the same cloud agility, scalability and efficiency, is a good alternative. However, for Cloud and Communications Service Providers (SPs), provisioning BMaaS can be time consuming and resource intensive, which eats into profitability.

A software-defined infrastructure (SDI) based on Intel® Rack Scale Design (Intel® RSD) enables SPs to quickly and efficiently deploy BMaaS. SPs can draw hardware from common pools without compromising security to enable automated deployment of compute, storage, and network resources in line with customer SLAs.

By deploying an SDI based on Intel RSD, SPs can benefit from improved operational efficiency and utilization, shorter time to market and a lower total cost of ownership (TCO). Ultimately this can make the delivery of BMaaS more profitable. Several vendors already offer Intel RSD-based SDI solutions designed specifically for BMaaS delivery.



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Business Challenge: Maximizing Profit

Cloud service adoption continues apace, as enterprises seek out greater flexibility, scalability, and efficiency. By 2020 Gartner predicts that more compute power will have been sold by Infrastructure as-a-Service (IaaS) and Platform as-a-Service (PaaS) cloud providers than sold and deployed into enterprise data centers[1].

That said, enterprises are migrating some workloads to the public cloud slowly, particularly those that require high-performance processing or those that must adhere to rigorous privacy or compliance guidelines. Some customers feel uneasy with these workloads being run in a virtualized environment shared with other customers.

An alternative solution is BMaaS. It provides a way for enterprises to complement virtualized cloud services with a dedicated server environment without sacrificing flexibility, scalability, and efficiency. Workloads can perform much better, since they do not have to compete for virtual resources. Additionally, privacy and compliance issues are minimized since the environment is dedicated, rather than multi-tenant.

This makes BMaaS a great choice for enterprises that need to perform short-term, data-intensive processing without any kind of latency or overhead delays, such as media encoding or render farms. It is also useful for those workloads that include highly sensitive datasets containing healthcare or financial services information.

However, for SPs, providing BMaaS is not always as lucrative as it could be. Currently it takes some time to provision services, from ordering the hardware to meeting the customer's specifications to installing the operating system (OS), and so on. Generally, this work is carried out manually which is resource intensive and time consuming. Ultimately, eating into the SP's profit margin.

Bare Metal as-a-Service

SPs face several challenges with regards to delivering BMaaS:

- Firstly, how to provision servers and service in a timely manner. Traditionally, BMaaS deployment is highly manual work carried out by data center operators. They must be on top of how hardware is being used – for example where compute, storage, and network resources are physically located, which servers are connected to which switches, and which resources are currently in use. Meeting customer demands for fast deployment where capacity needs to be allocated in near real-time and every customer's hardware requirements are different puts new requirements on both systems and data center operators
- Secondly, how to quickly repurpose hardware when customers complete their projects and terminate their workloads. It is essential that hardware is reallocated to new workloads as soon as possible to maximize data center efficiency. However, when compute, storage (both solid-state drives and memory), and networking all need attention this can be a labor-intensive process if it is done manually

The best way to address these challenges is by implementing an SDI at the data center level.

Pooled Resource Technology, Automation, and Orchestration

An SDI solution lets SPs discover resource and aggregate systems on demand from individual, disaggregated hardware components. When deploying BMaaS, three features of SDI play an important role:

1. Pooled resource technology

Once static hardware resources (static server configuration with CPU, memory, storage, and NICs) are logically freed from the hardware enclosure they reside in, they can be quickly and easily pooled and re-arranged dynamically in a variety of configurations.

SPs can deploy applications and workloads onto dynamically composed server nodes that have the sufficient compute power, storage, and network resource to meet a customers' bare-metal service requirements.

Once the service is completed, SPs can easily put back the compute, storage and network hardware into the overall resource pool for re-use.

With the ability to pool resources and better allocate them across the IT infrastructure, SPs can maximize their existing investments and reduce the TCO of delivering BMaaS through improved efficiency.

2. Automated discovery and management[2]

A centralized management system brings transparency to the data center, offering a single combined view of what's happening with hosted software applications and their underlying infrastructure resources. Many SDI management tools are built on open source reference implementations.

This single view is essential for BMaaS delivery as SPs can quickly ascertain whether specific resources can be allocated to a new customer, whether they are already in service, and whether they have the resources needed to fulfil a customer's SLA.

3. Data center orchestration

Data center orchestration is a key component in automated and industrialized data center operations. For an efficient BMaaS deployment, orchestration should be based on factors like customer SLAs, and TCO improvements including parameters like utilization, power costs, and operational costs.

With SDI solutions, SPs can use historical data to automate responses to this sort of information. For example, when the price of energy drops in one location, they can shift

workloads to take advantage of these lower costs; or when a system or set of components is running hot, SPs can automatically migrate the workloads to other hardware.

By deploying BMaaS with Intel RSD, SPs can benefit from improved operational efficiency and utilization, shorter time to market and a lower TCO.

Solution Architecture: Intel® Rack Scale Design

Running BMaaS on Intel RSD allows SPs to create custom server configurations such as specific types of Intel® processors, Intel® Solid-State Drives (Intel® SSDs) and memory to meet a broad spectrum of workloads. Configurations can be set up using open industry-standard APIs.

Intel RSD is both:

- A set of API specifications and open source reference software that allows SPs to pool resources. They are based on, and extend, DMTF's Redfish open industry standard specification and schema, which specify a RESTful interface and use JSON and OData to help customers integrate solutions within their existing data center environment
- And a reference architecture for a modern rack architecture design that OEMs and infrastructure vendors can implement to create SDI solutions for SPs

SPs can deploy legacy and virtualized workloads on the same Intel RSD infrastructure and manage them from one pane of glass – see figure 1. Intel RSD also offers frameworks to conduct resource accounting and reporting at a more granular level than is possible with traditional systems.

Inherently more flexible than rack and stack servers, Intel RSD enables SPs to quickly and dynamically configure customized systems to meet their customers' needs. As a standards-based solution, it also allows SPs to move away from non-interoperable systems tied to specific vendor's hardware so that they can benefit from greater choice and industry-wide innovation.

Conclusion

SDI solutions based on Intel RSD enable SPs to quickly and efficiently deploy BMaaS. Through disaggregation of hardware resources and automation it simplifies deployment and management of dynamically composed server nodes.

Enterprise customers can pick and choose the system configuration that best meets their workload needs from a pool of data center resources. SPs are also able to re-purpose resources as workloads change for different customers with very little manual intervention. SPs can also offer tiered pricing depending on the specific resources such as type of compute, SSD storage etc. customers need in their BMaaS configuration, generating incremental revenue for their business.

By deploying BMaaS based on an Intel RSD SDI solution, SPs can benefit from improved operational efficiency and utilization, shorter time to market and a dramatic reduction in CAPEX and OPEX. Ultimately, this can make the delivery of BMaaS more profitable.

With several Intel RSD-based SDI solutions designed for BMaaS already available from different vendors, it is easy for SPs to start reaping these benefits.

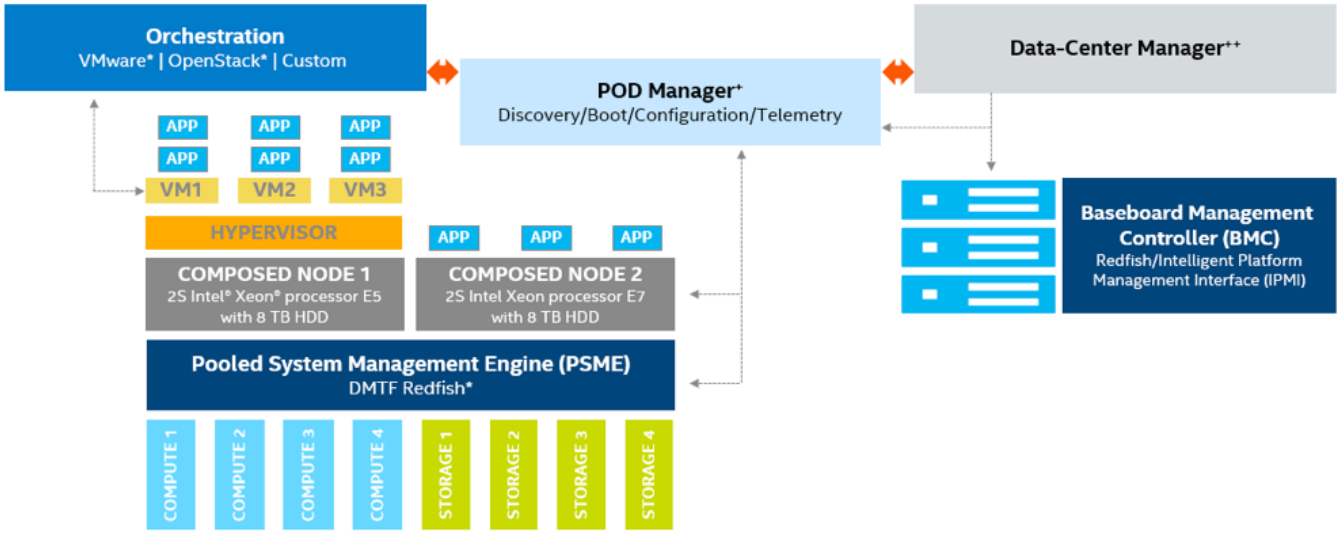

Figure 1. Intel® Rack Scale Design in an existing data center

Solutions Proven By Your Peers

Intel Solutions Architects are technology experts who work with the world's largest and most successful companies to design business solutions that solve pressing business challenges. These solutions are based on real-world experience gathered from customers who have successfully tested, piloted, and/or deployed these solutions in specific business use cases. Solutions architects and technology experts for this solution brief are listed on the front cover.

Learn More

You may also find the following resources useful:

- **Intel® Rack Scale Design**
  https://www.intel.com/content/www/us/en/architecture-and-technology/rack-scale-design-overview.html
- **Intel® Cloud Insider Program**
  www.intel.com/cloudinsider
- **Intel® Cloud Builder Program**
  https://cloudbuilders.intel.com

Find out how Intel can transform your data center

Find the solution that is right for your organization. Contact your Intel representative or visit **intel.com/communications**

Solution Provided By:

[1] http://www.gartner.com/newsroom/id/3354117

[2] Automated discovery and management are not yet supported by Intel® RSD

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