Oracle Solaris Virtualization: From DevOps to Enterprise

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Introduction

Oracle Solaris delivers a built-in, no compromise virtualization stack which brings with it security, performance, scalability and agility at no extra cost. In particular in a landscape where workloads are varied it also brings choice to the DevOps and the Enterprise user. Integrated tightly into the core of Oracle Solaris and all it's subsystems, Oracle Solaris virtualization offers a selection of solutions providing the right virtualization for your applications. You are no longer locked into a specific virtualization type, with Unified Archives you can move to any system and virtualization technology. This document discusses the latest developments, how to chose the right solution for you.

The Rise Of DevOps

Developer Operations or DevOps first grew to become of interest around 2009 as discussions around a philosophy aimed at improving communication and actions between the developer and infrastructure owner began. While the exact definition of what DevOps means is still open to debate there is an extremely large and rapidly growing interest in the methodology. With the advent of cloud that discussion has only become more intense. In addition there is growing evidence that DevOps can make significant improvements in deployment frequency, lowering failure rates, and faster mean time to recovery. While DevOps and the tools around it may not be the silver bullet that the industry is looking for it is arguable that many workloads are well suited to it.

But what does that mean for the infrastructure that DevOps environments would run on? If we go back in time a little then the requirements for DevOps vrs the Enterprise were quite different. For DevOps it could be argued that it's main requirements around operation were those of flexibility, tooling, quick release cycles and open standards. For Enterprise the types of workloads mandated a highly secure, highly available, efficient and scalable environment.

What we are now seeing is that these requirements are crossing over. As DevOps moves into the mainstream the workloads it runs need to be secure and available, in the Enterprise the need for flexible environments with quick release cycles has become mandatory. What this means for the underlying infrastructure and by rote the underlying OS, is that it must provide all these features. Oracle and Oracle Solaris are uniquely placed to provide and excel at all these requirements in one place.

Virtualization Options [Times New Roman 11 pt medium big]

With the requirement to virtualize so many different workloads the challange to the infrastructure manager has increased. It is clear that one size does not fit all and with single virtualization solutions compromise is always involved. With Oracle and Oracle Solaris the approach differs in that Oracle offers several different virtualizatioin types so that they may best fit the requirements of the application and infrastructure requirements.
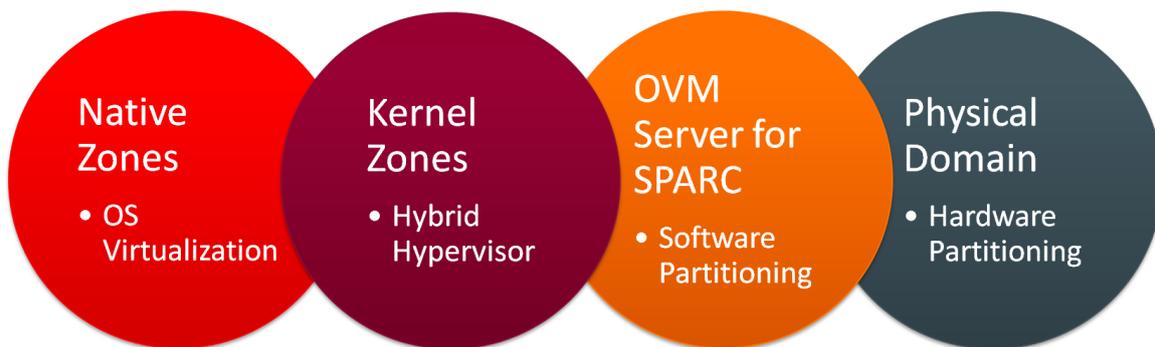

Illustration. 1: Oracle Solaris on SPARC virtualization choices

As can be seen in illustration 1, on Oracle SPARC hardware there are four different types of virtualization offerings. This allows the end users to select the right virtual environment and not be forced to use an imperfect one size fits all solution.

Choosing the Right Virtualization

With choice also comes the requirement to make a decision. The temptation here is to make the decision overly complex but, if you are aware of the requirements of your application it need not be as difficult as it first seems.

Current best practice is to start with a default position (in the case of Oracle Solaris) of using a Oracle Solaris Native Zone to encapsulate your application. This gives you the isolation, resource management, flexibility and zero cost virtualization as a good starting point. However Native Zones do have some limitations, like the inability to do live migration, at that point it may be necessary to look at Kernel Zones or another option. The main process is to start with a top down approach i.e. look at application requirements, Illustration 2 shows one way of doing this.
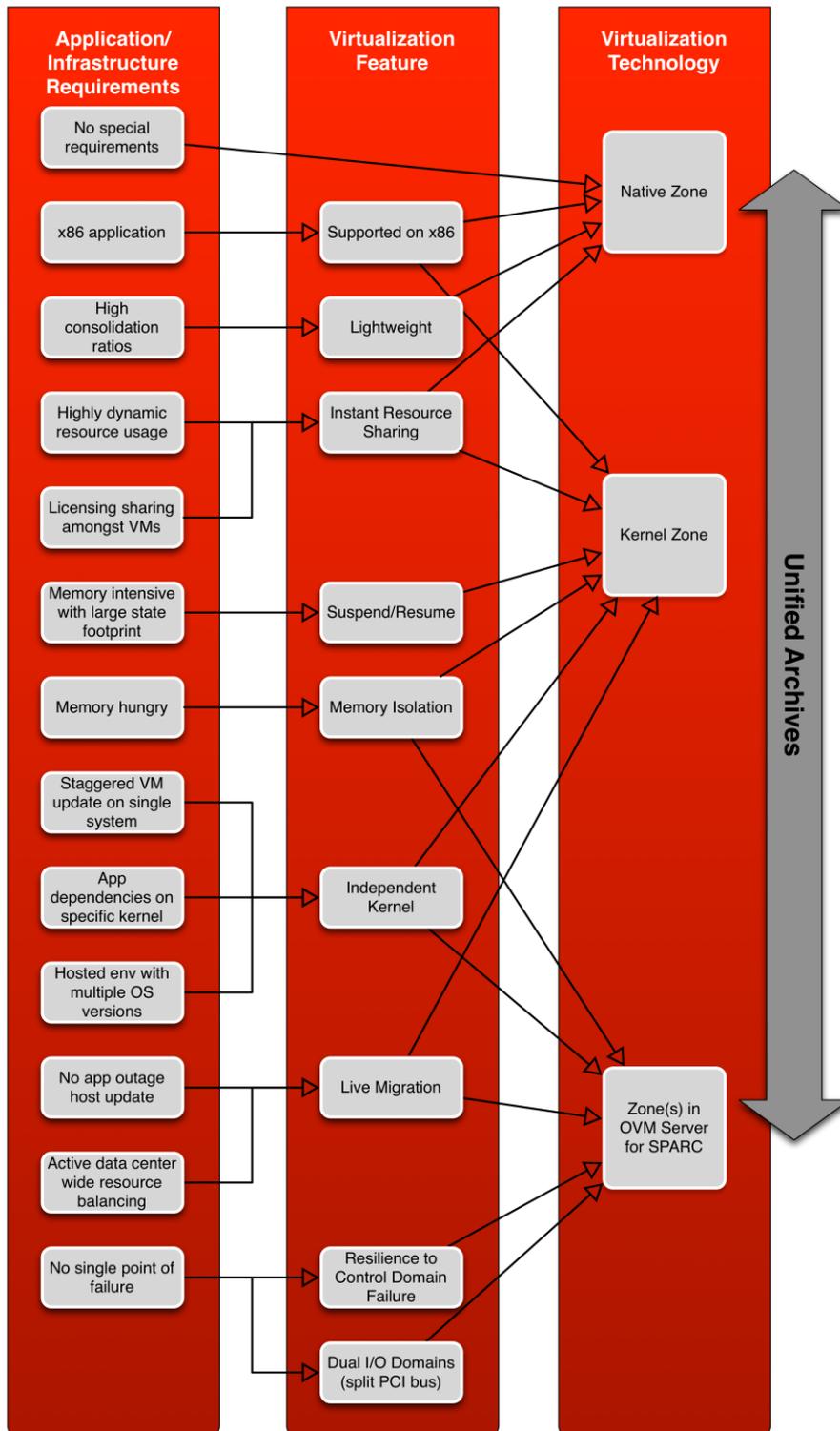
Illustration. 2: selecting your virtualization solution

Of course it is not always possible to make the correct selection at the start of a project. With the release of Oracle Solaris 11.2 virtualization choice is no longer a one-way street. With the use of Unified Archives it is possible to easily move between virtualization choices and even bare metal as

shown in Illustration 3. This takes away the anxiety of making the wrong initial choice for your environment.
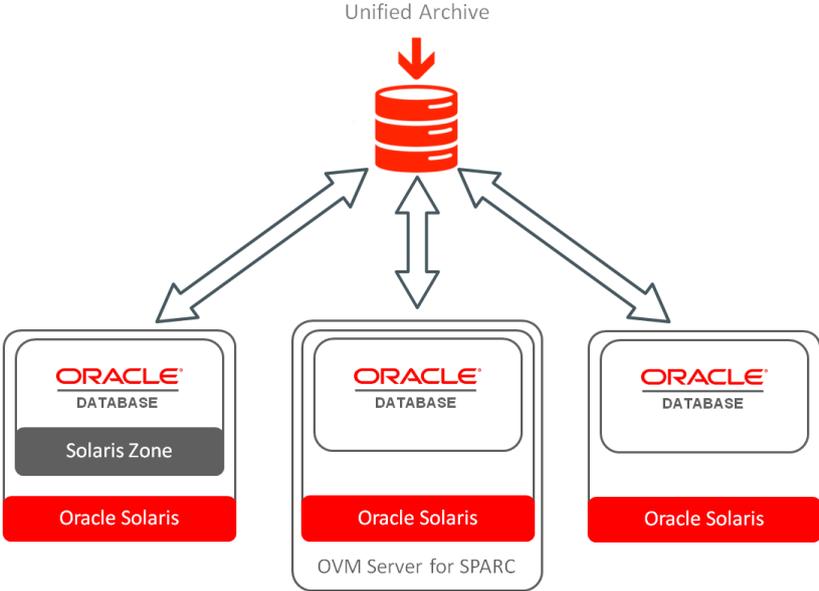

Illustration. 3: moving between a Oracle Solaris Zone, and OVM Server for SPARC instance and bare metal using Unified Archives

In practice the best solution has proved to be using Oracle Solaris Zones inside an OVM Server for SPARC guest (also known as an LDom or Logical Domain). With this approach you can get the best of both worlds, one example of a customer using this method to separate and make highly available different release cycles is shown in illustration 4.
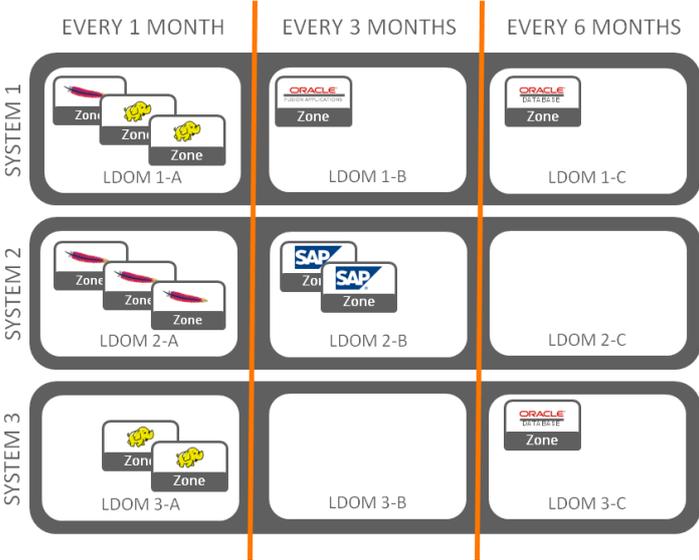

Illustration. 4: using LDoms and Oracle Solaris Zones to provide a highly flexible production environment

Securing your Virtual Environment [Times New Roman 11 pt medium big]

In common on both sides of the DevOps and Enterprise boundaries is the requirement to secure your environment. It seems like there is an article every week about the exposure of some personal data. In co-hosted cloud environments this is even more important. However this is not just about malicious attacks – by correctly configuring your security you can also help prevent in-house mistakes. One company estimated that approximately 50% of their outages were due to user error.

In Oracle Solaris we have introduced the idea of Read-only or Immutable Zones. With an Immutable Zone you can lock down the application environment. The key here is not only that you can lock down the environment but that you can also do it in a very simply and quick to implement manner. Indeed it is only one switch in the zone configuration to change and we provide ready made configurations for you to use. These are summarised in Illustration 5.

	None	Flexible	Fixed	Strict
/, /usr, /lb, ...	Writeable	Read Only	Read Only	Read Only
/etc	Writeable	Writeable	Read Only	Read Only
/var	Writeable	Writeable	Writeable	Read Only
other	Writeable	Read Only	Read Only	Read Only

Illustration. 5: Immutable Zone effects on filesystems

But Security is not just about a single point in the stack. Security experts regularly use the term Defence in Depth and just like Immutable Zones there are other points in the stack that provide simple, easy to configure security features. With Immutable Zones you can protect the application environment, with Data Link protection you can protect the network from things like MAC address spoofing, with ZFS encryption you can protect your data at rest. That is not all, at every level in the stack security is built in. Illustration 6 shows what some of this may look like.
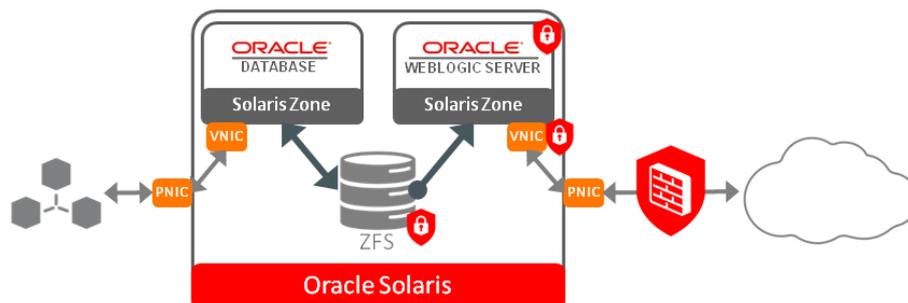

Illustration. 6: Security protection at every layer

Flexibility

Another common requirement is flexibility - this not only means the ability to move workloads around but also to make use of resources in the most efficient way.

With Oracle Solaris 11.3 Beta we introduced the ability to live migrate an Oracle Solaris Kernel Zone. Now it is possible to avoid outages when performing maintenance of the base hardware or even to load balance applications across the cloud as shown in Illustration 7.
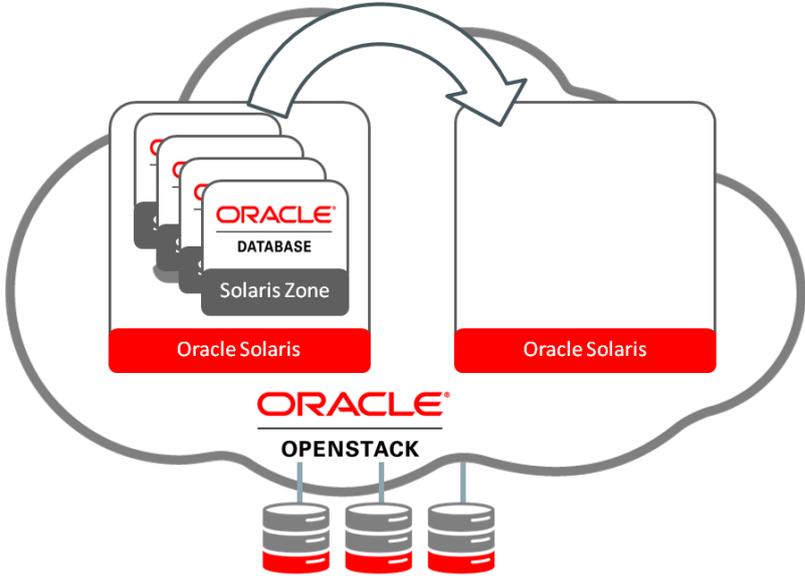

Illustration. 7: Live Migration with Oracle Solaris Kernel Zones

As well as efficiencies at the cross datacenter layer it is also desirable to also make best use of resources on each and every individual system. With Oracle Solaris Zones in the default configuration with no resource management it is possible for system resources to be instantly available where they are needed. Environments with particularly dynamic workloads are extremely well suited to this kind of setup. Likewise if you have applications that misbehave and need segregating off then Oracle Solaris Zones also provides the ability to assign specific resources. Illustration 8 shows how this may be visualized.
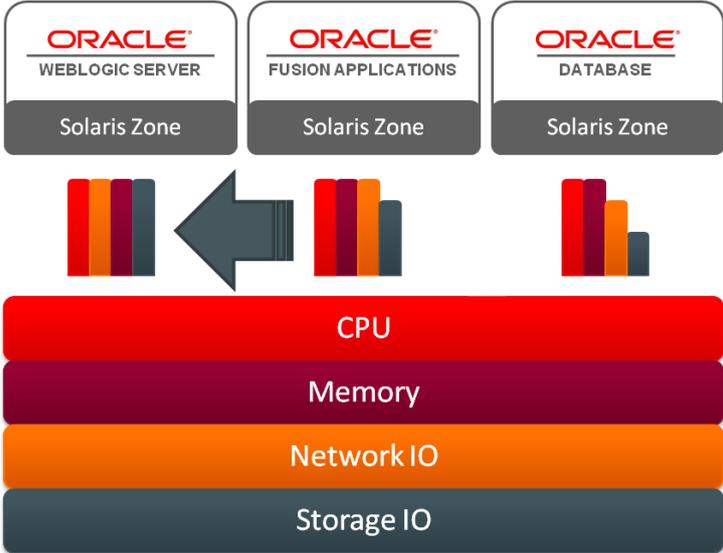

Illustration. 8: Instant resource re-assignment with Oracle Solaris Zones

Working in the Cloud

While there are many other requirements that are common between DevOps and Enterprise the final one that will be discussed in this paper is that of enabling this environment to work and be accessible in the cloud.

Oracle Solaris has taken the approach of providing a distribution of OpenStack. With this distribution end users can easily access the cloud and infrastructure administrators have access to a cross-industry standard, open implementation of a cloud infrastructure.

The top end look and feel may be the same but under the covers Oracle Solaris has taken the opportunity to offer best of breed solutions to the cloud user. The Nova service takes advantage of all the goodness of Oracle Solaris Zones, Cinder/Swift benefit from ZFS as the underlying filesystem, Neutron from the Oracle Solaris Network stack, etc. This is shown in Illustration 9.
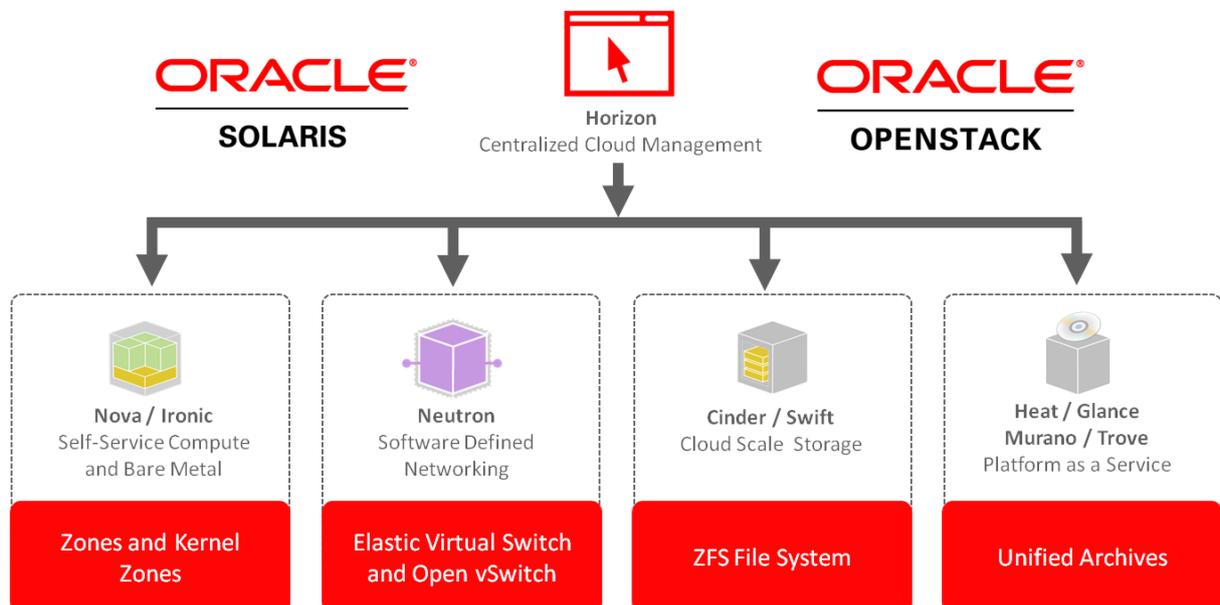

Illustration. 9: The Oracle Solaris distribution of OpenStack

In addition Oracle recently announced it's intent to bring the Docker toolset to Oracle Solaris. On one side Oracle Solaris delivers a great undercloud: secure, speedy and simple, on the other Docker helps get your apps distributed, packages them up, makes them available to all, and avoids inconsistencies across different platforms in a way that is open. Now you can get your applications securely into production faster than ever.

Conclusion

With the underlying requirements of DevOps and Enterprise infrastructures continuing to merge, Oracle Solaris is in the unique position of being able to provide a superior implementation of those traits needed for success.

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