

SUSE® Linux Enterprise High Availability Extension and Geo Clustering

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What is SUSE® Linux Enterprise High Availability Extension?

SUSE Linux Enterprise High Availability Extension is mature and industry-leading open source high-availability clustering technologies that is easy to set up and use. It can be deployed in both physical and virtual environments. Together with Geo Clustering for SUSE Linux Enterprise High Availability Extension, it helps to maintain business continuity, protect data integrity and maximize service uptime for mission-critical Linux workloads across local areas and even unlimited distances.

What's new in SUSE Linux Enterprise High Availability Extension?

SUSE Linux Enterprise High Availability Extension version 15 offers new functionality that makes it even easier to monitor and manage. HAWK, the web-based GUI for Pacemaker monitoring and managing, is now even more user-friendly and easier to use—increasing the visibility and improving the management of your high availability environment. The latest version includes Geo Clustering, which was a separate extension in prior versions (12 and earlier).

Geo Clustering for SUSE Linux Enterprise High Availability Extension is a best-in-class open source geo clustering solution. Improved geo recovery management, with the inclusion of a geo cluster bootstrap kit, simplifies cluster implementations. A new quick start guide for High Availability and Geo Clustering extensions helps you get up and running quickly. More information is available at www.suse.com/products/highavailability/geo-clustering.

When should I use SUSE Linux Enterprise High Availability Extension?

SUSE Linux Enterprise High Availability Extension is typically used for mission-critical Linux applications. Mission-critical workloads will vary depending on your individual business needs. However, mission-critical systems can generally be defined as

systems that enable revenue generation or support core business processes.

To ensure the continuous operation of your core business services when using industry-standard components, you need a way to protect your mission-critical systems from failure and increase service availability—either through greater reliability and redundancy or through faster failover to standby systems. Clustering and replication are time-proven methods that increase service availability through hardware and software redundancy.

Businesses are increasingly using Linux for mission-critical workloads such as databases, line-of-business applications such as ERP and CRM, online transactions processing and business intelligence applications. If your organization is using Linux and industry-standard components to deliver mission-critical services, you should consider SUSE Linux Enterprise High Availability Extension. With our high availability extension, you can safely depend on commodity hardware for your mission-critical workloads, deliver the services required by your businesses and contain costs.

What are the components of SUSE Linux Enterprise High Availability Extension?

SUSE Linux Enterprise High Availability Extension integrates the following features:

- *Pacemaker is a highly-scalable, policy-driven, cluster resource manager with a flexible policy engine that supports n-node clusters. Using Pacemaker, you can continuously monitor the health of your resources, manage dependencies and automatically stop and start services based on highly configurable rules and policies.*
- *OpenAIS is the Open Source Initiative's certified implementation of the Service Availability Forum Application Interface Specification. It is used for the product's clustering messaging and membership layer. OpenAIS is the leading*

standards-based communication protocol for server and storage clustering, and easily integrates with other infrastructure software.

- Corosync is the Open Source Initiative's certified implementation of a complete cluster engine and is supported alongside OpenAIS. It provides membership, ordered messaging with virtual synchrony guarantees, closed process communication groups and an extendable framework. First included in Service Pack 2, Corosync supports unicast and multicast communication. Unicast communication reduces the requirements for cluster installation by eliminating the need to implement specific configurations for multicast-enabled network components.
- OCFS2 is a shared-disk, POSIX-compliant, generic cluster file system. Using OCFS2, you can cluster a much wider range of applications for higher availability using cluster-aware POSIX locking, as well as resize your clusters and add new nodes on the fly. Cluster-aware applications are also able to use parallel I/O for higher performance. GFS2 read/write is also supported in SUSE Linux Enterprise High Availability Extension 12.
- Clustered Logical Volume Manager 2 (cLVM2) provides a more convenient, single, cluster-wide view of storage. Clustering extensions to the standard LVM2 toolset enable existing LVM2 commands to safely and simply manage shared storage, eliminating the need to learn a new set of tools.
- DRBD (Distributed Replicated Block Device) provides continuous data replication and node recovery. It is a leading open source networked disk management tool. Using DRBD, you can build single partitions from multiple disks that mirror each other to make data highly available. Also included is Relax and Recover (ReaR), a popular open source node recovery framework, for quick, bare-metal restorations.
- Resource agents for many open source and third-party applications are included at no additional charge. These components are scripts for monitoring popular open source services such as Apache, CTDB, MySQL, NFS, PostgreSQL, Tomcat, KVM and Xen. Also included are scripts for third-party applications such as SAP Instance and Database, Oracle Database, IBM DB2, Informix Dynamic Server, WebSphere Application Server and VMware. With these components, you can quickly and easily set up many

highly available data center services, using physical and virtual systems.

- A powerful unified command-line interface is included for experienced IT managers to quickly and easily install, configure and manage their clustered Linux servers. Also provided is a graphical user interface to give operators a streamlined, user-friendly tool for monitoring and administering their clustered environment. YaST® modules are also included for the configuration of DRBD, OpenAIS and multipath. These modules help IT managers improve productivity and more easily configure distributed storage systems and high availability solutions.

Can you explain DRBD in detail?

SUSE Linux Enterprise High Availability Extension includes support for distributed replicated block devices (DRBD). Using DRBD, a leading open source networked disk management tool, you can build single partitions from multiple disks that mirror each other and make data highly available. You can also quickly restore your clustered services by taking advantage of DRBD's fast data resynchronization capabilities.

DRBD mirrors the data of a high availability service from the active node of a cluster to its standby node. DRBD supports both synchronous and asynchronous mirroring. In the event of an outage, DRBD automatically resynchronizes the temporarily unavailable node to the latest version of data, without interfering with the service that is running. DRBD delivers the ability for active/active usage, providing replicated storage area network (SAN) semantics and enabling you to use cluster-aware file systems without additional SANs.

Can I use virtualization technologies within my clustered environment?

Yes, absolutely. The clustering technologies in SUSE Linux Enterprise High Availability Extension support physical and virtual environments equally well. Organizations are increasingly using virtualization to improve resource utilization, responsiveness and services availability. Many IT managers are looking at clustering virtual servers together to improve service availability; the low overhead associated with a virtual standby node makes it well-suited for this purpose. As workloads become consolidated among fewer physical servers, it becomes increasingly important that those systems be highly available.

SUSE Linux Enterprise Server includes KVM and Xen, the leading open source virtualization hypervisors. The cluster resource manager in SUSE Linux Enterprise High Availability Extension can recognize, monitor and manage services running within virtual servers created with KVM or Xen, as well as services running on physical servers. You can cluster together virtual servers, and can even cluster services within a virtual server. Moreover, you can cluster virtual servers with physical servers, and physical servers with each other—extending high availability from virtual to physical workloads.

In addition, the ability to encapsulate entire workloads within virtual guests means that you can easily replicate and manage them using the tools and capabilities provided with SUSE Linux Enterprise High Availability Extension, such as DRBD, OCFS2 and cLVM2. The combination of SUSE Linux Enterprise Server with integrated KVM, Xen and SUSE Linux Enterprise High Availability Extension, with support for virtualized environments, gives you unprecedented flexibility to improve services availability as well as resource utilization.

What if I want to build clusters between multiple data centers?

SUSE offers support for local, metro area and geographical clustering (geo clustering). Local and metro area clusters are supported as part of the SUSE Linux Enterprise High Availability Extension. Metro area clusters enable you to connect nodes at a distance of up to 30 kilometers. Geo Clustering for SUSE Linux Enterprise High Availability Extension is an additional product that maximizes your tolerance to regional catastrophic events by deploying physical and virtual Linux clusters between data centers located anywhere in the world.

Can you explain geo clustering in more detail?

Geo clusters are built between groups of local or metro area clusters. In the event of hardware failure or an incident such as a flood in the data center, SUSE Linux Enterprise High Availability Extension will take a failing workload and first transfer it within the local or metro area cluster to keep the service near its local user and infrastructure while minimizing latency. However, using Geo Clustering for SUSE Linux Enterprise High Availability Extension ensures that a workload will be restarted on another cluster in a far removed location in the event of a disaster that impacts the entire cluster (such as an earthquake or blackout).

Geo Clustering for SUSE Linux Enterprise High Availability Extension provides rules-based failover for automatic and manual transfer of the workload to another cluster outside of the affected area. Manual failover enables you to ensure alignment with your internal approval processes by providing maximum control over the movement of applications around the world and ensuring that other necessary resources are also assigned or moved. As a result, when disaster strikes data centers within a region, Geo Clustering for SUSE Linux Enterprise High Availability Extension ensures that enterprises can meet their service level agreements while maintaining compliance with corporate policies and external regulations.

Do I need an additional subscription for geo clustering?

No, not for version 15, because geo clustering is included with the SUSE Linux Enterprise High Availability Extension. In addition, version 15 and later includes technical support and maintenance as part of the SUSE Linux Enterprise High Availability Extension subscription.

For earlier versions (12 and earlier), an additional subscription for geo clustering is required. Also for version 12 and earlier, in order to receive technical support and maintenance for geographically clustered Linux servers, a separate Geo Clustering for SUSE Linux Enterprise High Availability Extension is required, in addition to active SUSE Linux Enterprise Server and SUSE Linux Enterprise High Availability Extension subscriptions.

For version 12 and earlier, a Geo Clustering for SUSE Linux Enterprise High Availability Extension subscription provides maintenance and the same level of support for this product as the support level of the underlying SUSE Linux Enterprise Server subscription. For example, if you have a Priority subscription for SUSE Linux Enterprise Server for a given system, you will receive priority support for Geo Clustering for SUSE Linux Enterprise High Availability Extension for that system, too.

Why should I choose SUSE Linux Enterprise High Availability Extension over other options?

When you choose SUSE Linux Enterprise High Availability Extension, you get the most modern open source, high availability solution that supports clustering physical and virtual environments, with these features and benefits:

- *A mature and industry-leading solution, compared to other proprietary and open source clustering solutions. An annual support subscription for SUSE Linux Enterprise High Availability Extension offers the same functionality as Symantec's Veritas Cluster Server and SteelEye's LifeKeeper. Furthermore, included in our subscription price are resource agents—assets that other vendors charge extra for. An annual subscription to SUSE Linux Enterprise High Availability Extension includes OCFS2, GFS2, DRBD, ReaR, network load balancing, metro area clustering, clustered Samba (CTDB), and SAP resource agents. In contrast, other solutions either have no functionality in these areas or charge separately for these components, which are essential to a complete high availability solution. (As of this writing, Red Hat does not offer geo clustering.)*
- *z Systems support. Unlike most other vendors, SUSE offers HA functionality for IBM z Systems architecture. This is included in the subscription of SUSE Linux Enterprise Server for z Systems and LinuxONE. With HA functionality on IBM z Systems, you can build an extra layer of availability for your mission-critical workloads.*
- *One of the most robust and secure high availability solutions in the market today. This is because of the tight integration of its clustering technologies with each other and the integration of these technologies with SUSE Linux Enterprise Server. Modern high availability clustering solutions incorporate multiple components to continuously monitor the health of clustered resources, manage dependencies and automatically stop and start services based on rules and policies. These components interact with each other and through the operating systems of the clustered servers to ultimately deliver highly available services. All of the essential technologies in SUSE Linux Enterprise High Availability Extension have been developed, qualified and tested with each other and with SUSE Linux Enterprise Server to ensure that they function as intended and work in concert to deliver the desired results. What's more, because both the operating system and clustering software are delivered by one vendor—SUSE—customers conveniently have just one place to call for any support issues.*

Is OCFS2 shipped with SUSE Linux Enterprise High Availability Extension?

Yes. It is the recommended clustering file system for SUSE Linux Enterprise High Availability Extension.

Why is the product called an “extension”?

The product is called an extension because it is an add-on to SUSE Linux Enterprise Server and because it “extends” the capabilities of the server operating system. You need both SUSE Linux Enterprise Server and SUSE Linux Enterprise High Availability Extension to set up highly-available Linux clusters. Paid subscriptions to both products are required to get technical support and maintenance for your clustered Linux servers.

What subscription and support options does SUSE offer for SUSE Linux Enterprise High Availability Extension?

There is a single subscription price for SUSE Linux Enterprise High Availability Extension per socket pair. SUSE Linux Enterprise High Availability Extension is included as part of your SUSE Linux Enterprise Server for IBM POWER and IBM z Systems hardware architectures.

When you purchase a subscription for SUSE Linux Enterprise High Availability Extension, you receive the same level of support for this product as the support level of your underlying SUSE Linux Enterprise Server subscription. For example, if you have a Priority subscription for SUSE Linux Enterprise Server for a given system, you will receive Priority support for SUSE Linux Enterprise High Availability Extension for that system as well. All subscriptions for SUSE Linux Enterprise products entitle you to upgrades, patches, security fixes, technical support, IP indemnification and much more. For more information about our subscription options, please visit www.suse.com/support.

Where can I get SUSE Linux Enterprise High Availability Extension?

You can purchase SUSE Linux Enterprise High Availability Extension directly from SUSE or from one of our resellers and solution providers.

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- To buy directly from SUSE, please visit [our website](#).
 - To buy via a reseller or solution provider, check out [our partner finder](#).

We would like to deploy Linux clusters and could use some assistance. How can SUSE help us?

You can deploy and manage SUSE Linux Enterprise Server clusters with complete confidence, knowing you're backed by SUSE's world-class services organization. Whether you run a small business or a global enterprise, SUSE has the resources you need to build and manage your IT environment. Leverage our consulting experts, obtain industry-leading training and access our award-winning support organization to ensure you get the most from your IT investment.

You can count on SUSE to provide the services you need so you can focus on what matters most to you—your business. However, the value that we deliver is not from our solutions alone. Interoperable solutions and mixed IT environments simply can't work without strong, productive partnerships. We share our product expertise, best practices and delivery methodologies with our qualified service partners so they can provide best-of-breed services for our solutions. We have more than 5,100 partners, including some of the most respected names in the industry. These partners include 3,200 solution providers, value-added resellers (VARs) and value-added distributors (VADs); more than 500 training partners; and more than 1,300 technology partners, both independent software and hardware vendors.

SUSE and its partner organizations back SUSE Linux Enterprise Server and SUSE Linux Enterprise High Availability Extension with a comprehensive set of offerings for implementation and training, specialized practices in enterprise platform services, data center technologies and open source development. We are ready to help you quickly deploy SUSE Linux Enterprise High Availability Extension inside your organization. For more information about the service options available, please visit www.suse.com/services.

How much do the SUSE Linux Enterprise High Availability Extension and Geo Clustering for SUSE Linux Enterprise High Availability Extension cost?

There is no license fee for using the SUSE Linux Enterprise High Availability Extension. In fact, you can download the clustering software for free from www.suse.com/products/highavailability/download/.

SUSE charges a small fee, however, for support and maintenance. A paid subscription to SUSE Linux Enterprise High Availability Extension comes with major benefits: immediate delivery of upgrades, patches and security fixes; access to award-winning SUSE technical support; IP indemnification; and much more. For our most current pricing, please visit www.suse.com/support/programs/subscriptions/?id=SUSE_Linux_Enterprise_High_Availability_Extension.

Where do I get more information?

For more information about SUSE Linux Enterprise High Availability Extension and Geo Clustering for SUSE Linux Enterprise High Availability Extension, visit: www.suse.com/products/highavailability.

For more information about SUSE Linux Enterprise Server, visit: www.suse.com/products/server.

For more information about SUSE Linux Enterprise, visit: www.suse.com.

For more information about support and services for SUSE Linux Enterprise Server, visit: www.suse.com/services.

Contact us at:
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