

## CenturyLink Technology Solutions Service Guide

### Managed Application Software 1.0

#### Apache Tomcat Server

This Service Guide (“SG”) sets forth a description of the Managed Application Software 1.0: Apache Tomcat Server Service (“Service”) offered by CenturyLink, including technical details and additional requirements or terms. This SG is subject to and incorporated into the Agreement and Hosting Service Schedule between the parties. The specific details of the Service ordered by Customer will be set forth on the relevant Service Order. For avoidance of doubt, any references in the Agreement, Schedules, or Service Orders to SSG, shall mean SG.

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## Service Description

1. **Standard Service Description:** Managed Application Software 1.0: Apache Tomcat Server (the “Service”) consists of the installation, configuration, administration, monitoring, maintenance and support for the Apache Tomcat Software (the “Software”) components listed in section 1.1. The Service Level Agreement (SLA) associated with this Service Guide is the “Managed Hosting Services SLA
- 1.1. **Software Components:** The Software is compiled to CenturyLink’s standards in the below supported versions and with the below supported services. Customer selects the version and CenturyLink installs all Supported Services listed below.
  - 1.1.1. **Supported Versions:**
    - 1.1.1.1. Apache Tomcat 6.0.xx with JDK 1.6
    - 1.1.1.2. Apache Tomcat 7.0.xx with JDK 1.6
  - 1.1.2. **Supported Services:**
    - 1.1.2.1. Oracle Java JDK (Enterprise Edition)
    - 1.1.2.2. HTTP Filtering (Tomcat “valves” and Tomcat “filters”)
    - 1.1.2.3. SSL Configuration
    - 1.1.2.4. XML
- 1.2. **Licensing:** CenturyLink maintains the licenses in compliance with the Apache Open Source Software Foundation (ASF) terms <http://www.apache.org/licenses/LICENSE-2.0>. All users of the Service are subject to the terms and conditions of the referenced license agreements.
- 1.3. **Installation:** CenturyLink will provide installation tasks marked with an “X” in the CenturyLink column in Table 1.0 Roles and Responsibilities for the supported operating systems and hosting CenturyLink platforms listed below:
  - 1.3.1. **Supported Operating System:**
    - 1.3.1.1. Red Hat Enterprise Linux AS5 version 5.x (64 bit)
    - 1.3.1.2. Red Hat Enterprise Linux AS6 version 6.x (64 bit)
  - 1.3.2. **Supported Hosting Platforms:**
    - 1.3.2.1. CenturyLink Cloud
    - 1.3.2.2. CenturyLink Dedicated Cloud
    - 1.3.2.3. Intelligent Hosting
- 1.4. **Configuration:** CenturyLink will provide configuration tasks marked with an “X” in the CenturyLink column in Table 1.0 Roles and Responsibilities.
- 1.5. **Administration:** CenturyLink will provide administration tasks marked with an “X” in the CenturyLink column in Table 1.0 Roles and Responsibilities.
  - 1.5.1. **Security:** CenturyLink utilizes CIS Level 1 security benchmarks and NIST for additional security standards when deploying the Service and will provide security policies for the Service upon request.
  - 1.5.2. **Access:** Customer is provided login access and access to Software directories but not root or sudo access.
- 1.6. **Monitoring:** CenturyLink will provide monitoring tasks marked with an “X” in the CenturyLink column in Table 3.0 Roles and Responsibilities. CenturyLink will enable application level monitoring for each Environment as they are created within the product configuration.
  - 1.6.1. **Production Environment Notification:** CenturyLink will retain primary notification and resolution responsibilities for all automated environment alerts in the production environment. The production environment is subject to SLA credits.
  - 1.6.2. **Non-Production Environment Notification:** A Customer technical contact will be engaged to perform primary resolution of incidents associated with a non-production level environment. The non-production environment is not subject to SLA credits.
  - 1.6.3. **Monitors:** Table 2.0 lists the Software data points that are monitored to assess the performance of the Service.

- 1.7. **Maintenance and Support:** CenturyLink will provide maintenance and support tasks marked with an “X” in the CenturyLink column in Table 3.0 Roles and Responsibilities.
  - 1.7.1. **Patch Releases:** CenturyLink compiles, packages, certifies, approves and delivers Software patch branch versions for installation in a Customer environment. Customer must approve the installation by contacting CenturyLink support. Any Outages directly caused by Customer's failure to accept the implementation of a patch will not be subject to SLA Service Credits.
  - 1.7.2. **Change Management:** All changes to the CenturyLink managed applications; systems, network and facilities are subject to CenturyLink's change management process. This process is intended to confirm that work is reviewed for completeness (risk assessment, completed test procedure, metrics for measuring progress, back out procedure, etc.) and accuracy prior to scheduling and implementation.
  - 1.7.3. **Maintenance Windows:** All times listed under Schedule Maintenance Windows are local times and subject to change. CenturyLink will use commercially reasonable efforts to perform routine maintenance only during the Saturday or Sunday defined maintenance windows. See Definitions for additional information.
  - 1.7.4. **Support:** Support for the Service is provided through the project manager during installation, content migration and Customer validation. At the point of go-live the Service is passed from project management to CenturyLink Service Center for full 24x7 monitoring and management. The point of go-live is when Customer notifies CenturyLink project manager that the environment is ready to go-live.
2. **Customer Responsibilities:** Customer is responsible for all tasks with an “X” in the Customer column in Table 3.0 Roles and Responsibilities. Customer acknowledges and agrees that its failure to perform its obligations set forth in Table 3.0 may result in CenturyLink's inability to perform the Services and CenturyLink shall not be liable for any failure to perform in the event of Customer failure.
  - 2.1. **Provide Contact:** Designate and maintain a Customer Contact during the Service term (including current contact information). Customer Contact means a technical point of contact available 24 x 7 with sufficient knowledge, authority and access to address configuration issues, event notifications, system or infrastructure modifications and authentication of applicable CenturyLink systems.
3. **Additional Services:** Customer can choose to have CenturyLink complete one or more of the tasks in Table 3.0 with an “X” in the Customer column. The tasks can be added to the standard Service (described in Section 1.0) for an additional fee described in a separate Statement of Work (“SOW”) and/or Service Order. Contact a sales representative for additional information.
  - 3.1. **Minor Releases:** Minor Releases (see Definitions) require a new installation of the software binaries, which is not included in this Service. CenturyLink recommends that Customer purchase a new managed server (via a Service Order) and migrate data (defined in a SOW) as a best practice.
  - 3.2. **Major Releases:** Major Releases (see Definitions) require a new installation of the software binaries, which is not included in this Service. CenturyLink recommends that Customer purchase a new managed server (via a Service Order) and migrate data (defined in a SOW) as a best practice.
  - 3.3. **SSL Certificates:** SSL Certificates are small data files that digitally bind a cryptographic key to an organization's details. When installed on a web server, it allows secure connections from a web server to a browser.

## Tables and Appendices

**Table 1.0 Roles and Responsibilities**

Activity	Task	CenturyLink	Customer
License	Procure SSL Certificate (if purchased)	X	
	Maintain Licensing in accordance with the Apache Open Source Software Foundation (ASF)	X	
Installation	Prepare Server for Application Service (OS Specific Parameters)	X	
	Provide detailed requirements prior to physical build work		X
	Install Oracle JDK	X	
	Install Apache Tomcat Server	X	
	Harden Apache Tomcat to CIS Level 1 and CenturyLink Standards	X	
	Install CenturyLink Monitoring	X	
	Perform Quality Assurance against Apache Tomcat Installation/Hardening	X	
	Provide sign off that environment is ready to go-live		X
Configuration	Configure application server clusters	X	

Activity	Task	CenturyLink	Customer
	Configure Communication Between CenturyLink Managed Apache HTTPd Web Server and Apache Tomcat Server	X	
	Deploy Customer Code and Content (EAR/WAR Files)		X
	Configure JVM parameters		X
	Create JDBC resources		X
	Modify Container Parameters.		X
	Configure CenturyLink Monitoring	X	
	Install and configure CenturyLink Disk/Tape Backups (if purchased)	X	
	Data validation, User Acceptance Testing (UAT), Site Acceptance Testing (SAT)		X
Administration	Maintain Customer Code and Content		X
	Customer Code and Content Packaging		X
	Management and coordinate all activities associated with an environmental version control system.		X
	Application Log Monitoring	X	
	Restart/Stop/Start Tomcat Services (JVM)	X	

Activity	Task	CenturyLink	Customer
	Update managed servers with all recommended security patches, service packs and hot-fixes upon customer request	X	
	Request/Initiate DNS Zone changes when using CenturyLink managed DNS Services		X
	Log Management (Rotation & Removal)	X	
	End user identity and access management		X
Maintenance and Support	Coordinate minor version upgrades and patching with Customer during maintenance hours	X	
	Customer initiated Redundancy & High Availability Test/Audit (Excludes Disaster Recovery testing)	X	

**Table 2.0 Monitors for Apache Tomcat**

Monitor	Description	Frequency
Tomcat Filesystem	The Tomcat file system is over 80%	2 Min
Tomcat Proc	The Tomcat process is running	2 Min
Tomcat JVM CPU	The Tomcat JVM CPU usage is above 80%	2 Min
Tomcat JVM Core	The Tomcat JVM core has created a Heap Dump	2 Min
Tomcat JVM Port	The Tomcat JVM HTTP/S port is listening	2 Min
Tomcat JDBC Connections	The Tomcat JDBC Connection threshold has been exceeded	2 Min

## Definitions and Terms:

**Apache Open Source Software Foundation (ASF):** provides support for the Apache community of open-source software projects, which provide software products for the public good.

**Apache Tomcat Server:** Apache Tomcat Application Server (Tomcat) is a software application server built using open standards such as Java Enterprise Edition, XML, and Web Services.

**Application Programming Interface (API):** a set of programming instructions and standards for accessing a Web-based software application or Web tool.

**CIS:** Center for Internet Security develops and distributes consensus-based and internationally recognized solutions that help organizations improve their cyber security and compliance posture.

**CIS Level I Benchmarks** define minimum standards for securing various operating systems including Windows, and variations of Unix. These standards should be used to improve the “out of the box” security of common operating system software to a prudent “due care” minimum level. By definition, the security actions included in CIS Level I Benchmarks satisfy three conditions: (1) they can be safely implemented by a system administrator of any level of technical security skill, (2) they will generally “do no harm” to functionality commonly required by everyday users, and (3) they can be scored by an associated software tool. This document is an example of a Level I Benchmark.

**Compiled:** The compilation function turns source files into directly executable or intermediate objects. Not every project will require this function. While for simple programs the process consists of a single file being compiled, for complex software the source code may consist of many files and may be combined in different ways to produce many different versions.

**Environment:** The setting where software and other products are placed into operation for their intended uses by end users

**Extensible Markup Language (XML):** Extensible Markup Language is a flexible way to create common information formats and share both the format and the data on the World Wide Web.

**Java Platform:** Oracle's enterprise Java computing platform provides an API and runtime environment for developing and running enterprise software, including network and web services, and other large-scale, multi-tiered, scalable, reliable, and secure network applications.

**Maintenance Windows:** A period of time designated in advance by CenturyLink, during which preventive maintenance that could cause disruption of service may be performed. Current Scheduled Maintenance windows are:

- Americas: Saturday 00:00AM to 5:00AM; Sunday 00:00AM to 5:00AM
- EMEA: Saturday 02:00AM to 6:00AM
- APAC (Except Japan): Saturday 21:00 (GMT) AM to Sunday 01(GMT)
- Japan: Sunday 04:00 (JST) to 8:00 (JST)

**Major Release:** Major Releases (X.y.z) are vehicles for delivering major and minor feature development and enhancements to existing features. They incorporate all applicable error corrections made in prior Major Releases, Minor Releases, and Patch Releases. Supplier typically has one Major Release per year.

**Minor Release:** Minor Releases (x.Y.z) are vehicles for delivering minor feature developments, enhancements to existing features, and defect corrections. They incorporate all applicable error corrections made in prior Minor Releases, and Patch Releases.

**NIST:** National Institute of Standards and Technology is the federal technology agency that works with industry to develop and apply technology, measurements, and standards.

**Non-Production Environment:** A product is still being used theoretically. Users, typically engineers, look for bugs or design flaws.

**Packaging:** is the process of creating a meta-program that in turn automatically installs software across multiple computers. The meta-program typically includes a set of default properties for the applications it installs.

**Patch Branch:** The term used to describe development releases for Apache.

**Patch Release:** A patch is a small piece of software that is used to correct a problem with a software program or an operating system. Patches are often called "Patch Updates" and are Critical or Security related.

**Production Environment:** A production environment can be thought of as a real-time setting where programs are run and hardware setups are installed and relied on for organization or commercial daily operations.

**SLA Credit:** SLA Credit: Service Level Agreement Credits are refunds given by CenturyLink to a Customer if the service falls below a contractually agreed service levels. See Section 1.0 for the SLA agreement associated with this service.

**Software Binaries:** A binary file is a file whose content must be interpreted by a program or a hardware processor that understands in advance exactly how it is formatted.

**Statement of Work:** A statement of work (SOW) is a formal document that captures and defines the work activities, deliverables, and timeline a vendor must execute in performance of specified work for a client. The SOW usually includes detailed requirements and pricing, with standard regulatory and governance terms and conditions.

**Supplier:** The third party that makes and sells software products described in section 1.0.

**Upgrades:** Upgrades mean a Major Release or Minor Release of the software.