# Service Level Agreements

## Overview

In up.time, a service level agreement (SLA) measures your IT infrastructure's ability to meet performance goals, particularly from the end-user perspective. Different goals can focus on different aspects of your infrastructure from underlying network performance, to back-end database availability, to user-facing application server response time. Given this broad coverage, a performance goal encompasses anything from a handful of monitored systems to an entire production center.

Defining and working toward fulfilling SLAs provides you with more insight into the performance and planning of your infrastructure:

- Measure the performance of your infrastructure from the end-user perspective.
  An SLA can measure the success of your IT infrastructure by using end-user-focused service monitors such as the Web Application Transaction monitor and the Email Delivery monitor.
- Translate IT infrastructure demands into quantifiable and reportable goals.
  Use SLAs to methodically set expectations on all or the most critical aspects of your infrastructure. SLAs provide you with metrics with which you can gauge the success of your network administration.
- Use trends to anticipate new infrastructure requirements.
  Trend lines in SLA reports can give you an estimate for when your current hardware deployment will require augmentation.
- Generate SLA reports that demonstrate compliance and break down objectives.
  Compliance reports quantify the value of the IT department's efforts, and objective-based reports exist to identify recurring problems that affect business outcomes.

## SLAs, Service Monitors, and SLOs

Like other up.time Elements (i.e., systems, network devices, and Applications) an SLA definition consists of service monitors that you have previously created. Depending on its use, an SLA can consist of a single service level objective (SLO) that in turn consists of a single service monitor.

In other cases, an SLA's coverage can be broad enough to include an ungainly list of service monitors; in this case the SLA can be refined to consist of multiple SLOs that focus on different aspects of the SLA. Creating multiple objectives helps you further refine your performance targeting and reporting.

For example, consider an SLA called "Web Application" that focuses on IT performance for end users. The SLA's objectives could be broken down by performance:

- SLO 1, application availability: the application is available 99% of the time (e.g., using an HTTP monitor)
- SLO 2, application speed: the application's Web transactions always complete in fewer than 10 seconds (e.g., using the Web Application Transaction monitor)

Consider another example: an SLA called "Customer Service Group" that focuses on the operational readiness of a support team. The SLA's objectives could be broken down by application:

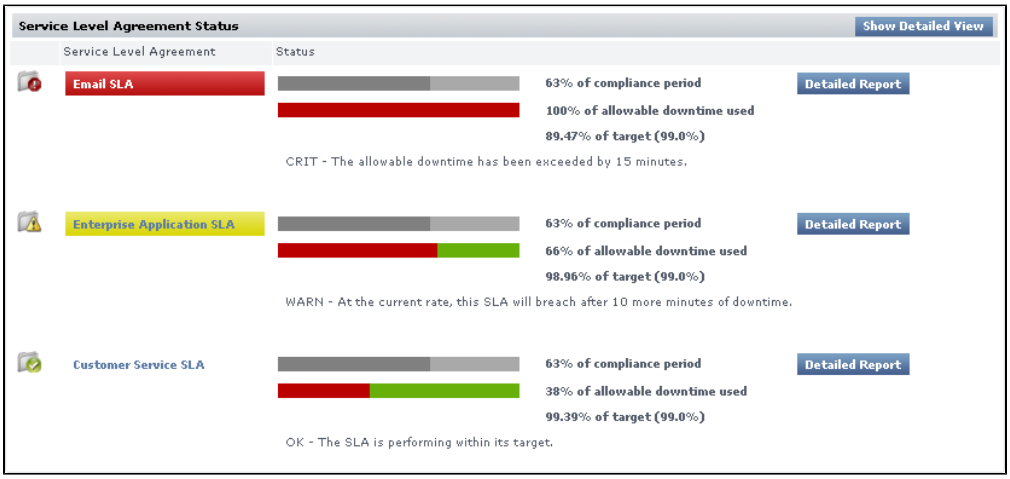
- SLO 1: helpdesk application
- SLO 2: bug-tracking application
- SLO 3: email service

## Viewing Service Level Agreements

Service level agreements are viewed in **Dashboards** for monitoring, and in **My Infrastructure** for configuration.

### Viewing SLA Status

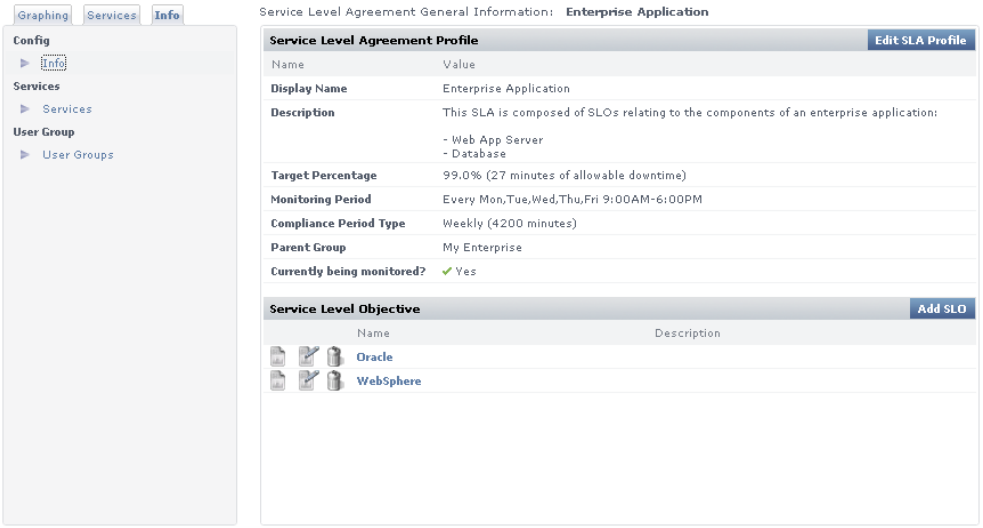
You can view the status of all your service level agreements in the **SLAs** dashboard, which can be accessed by clicking **Dashboards**.



For more information about what kind of SLA information you can view on the **SLAs** dashboard, see Viewing All SLAs.

## Viewing SLA Details

The details of an SLA definition can be viewed in the **Service Level Agreement General Information** subpanel. This can be accessed from the **My Infrastructure** panel by clicking the SLA name listed among the Elements, or from the **Global Scan** dashboard by clicking the **Info** tab in the Tree panel, then clicking **Info**.




The **General Information** subpanel displays a summary for the SLA that includes the following:

- Target Percentage: the targeted percentage of up time of the SLA's component services over the Monitoring Period
- Monitoring Period: the days and time frames during which uptime is measured
- Compliance Period Type: the compliance period intervals over which SLA compliance is measured (i.e., weekly or monthly)
- Service Level Objectives: a listing of the SLOs into which the SLAs services have been organized

You can view information about the services that make up the SLA by clicking the **Services** tab in the Tree panel.

Clicking the **Graphing** tab in the Tree panel, then clicking **Current Status** displays a verbose status summary of the SLA that includes the following:

- Trend Analysis: SLA status indicator for the current compliance period
- Compliance Period and Allowable Downtime Used: the current progress through the compliance period, and how close the SLA is getting to reaching a critical state
- Achieving (SLA): how close the SLA is to its performance target; how recoverable a failing SLA is, based on how far it is from its target
- Achieving (SLOs): an SLO-level breakdown of how well or poorly each SLO is meeting its performance target; how recoverable failing SLOs are, based on how far it is from its target

See A Note About SLOs and Compliance for more information about SLOs and the Achieving statistic.

# SLA Compliance Calculation

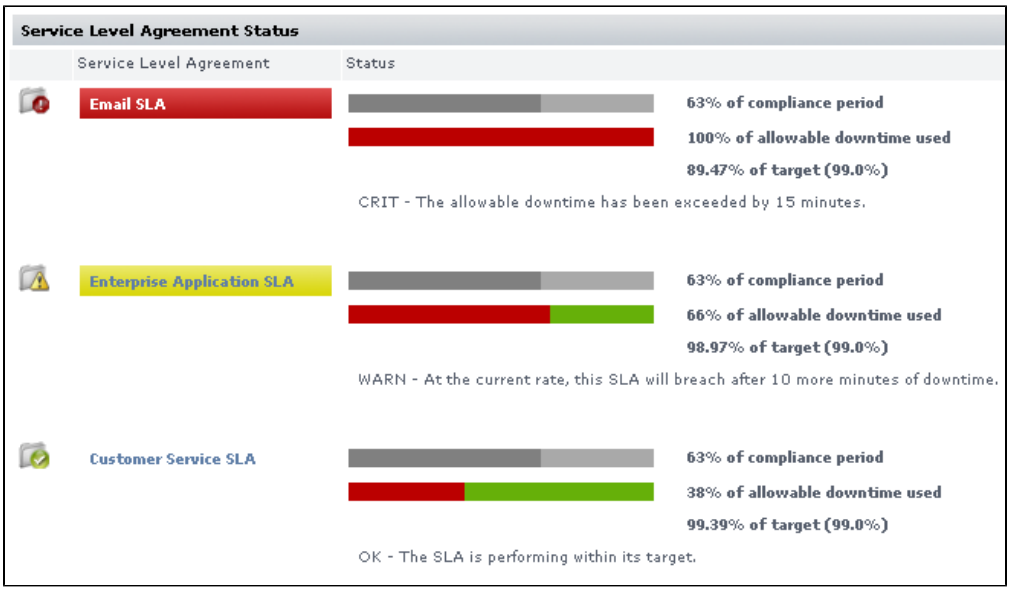
SLA downtime occurs when any of the SLA's services are in a critical state. An SLA is compliant if its downtime has not exceeded a maximum number of minutes over a one-week or one-month Monitoring Period.

For example, consider an SLA whose compliance period type is weekly and its Monitoring Period is Monday through Friday, 9 p.m. to 5 p.m. The Monitoring Period consists of five eight-hour days--in other words, 40 hours, or 2400 minutes. If the SLA's target is 95%, it has 120 minutes of allowable downtime for any of its services.

## Reporting SLA Status

An SLA's reported status on the **Global Scan** dashboard includes the following in the form of progress bars: the percentage of the Monitoring Period that has expired, and the percentage of allowable downtime consumed during the Monitoring Period. (See Viewing All SLAs for information about SLA information on the **Global Scan** dashboard.)

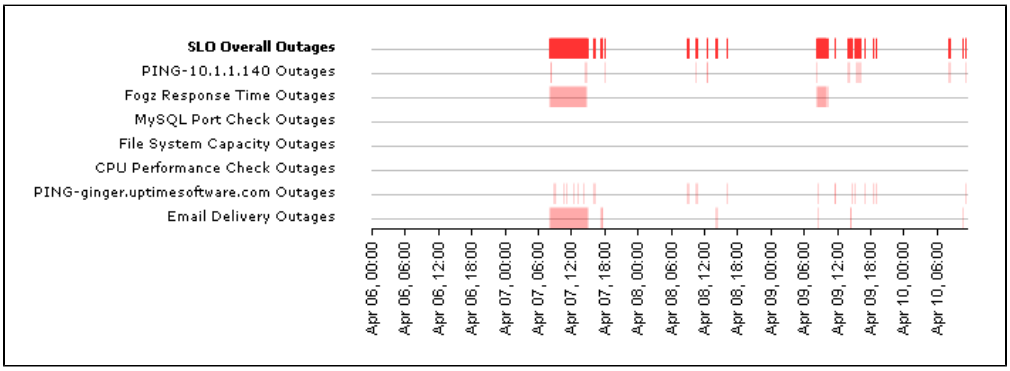
An SLA will reach a critical state when its allowable downtime has been depleted. An SLA will reach a warning-level state when its allowable downtime, at the current rate of use, will be depleted before the compliance period has ended. These states, and their conditions under which they happen, are shown on **Global Scan**.




## Handling Simultaneous Service Downtime

The simultaneous downtime of multiple services does not cumulatively impact an SLA's remaining allowable downtime; the term "allowable downtime" can be expanded to mean the amount of time during which there can be any service downtimes (until the compliance period has ended, after which the counters are reset).

In the following outage graph for an SLO, note that any time an outage is experienced--whether by one or four services--the SLO is deemed to have experienced an outage, which is reflected in the top red line:

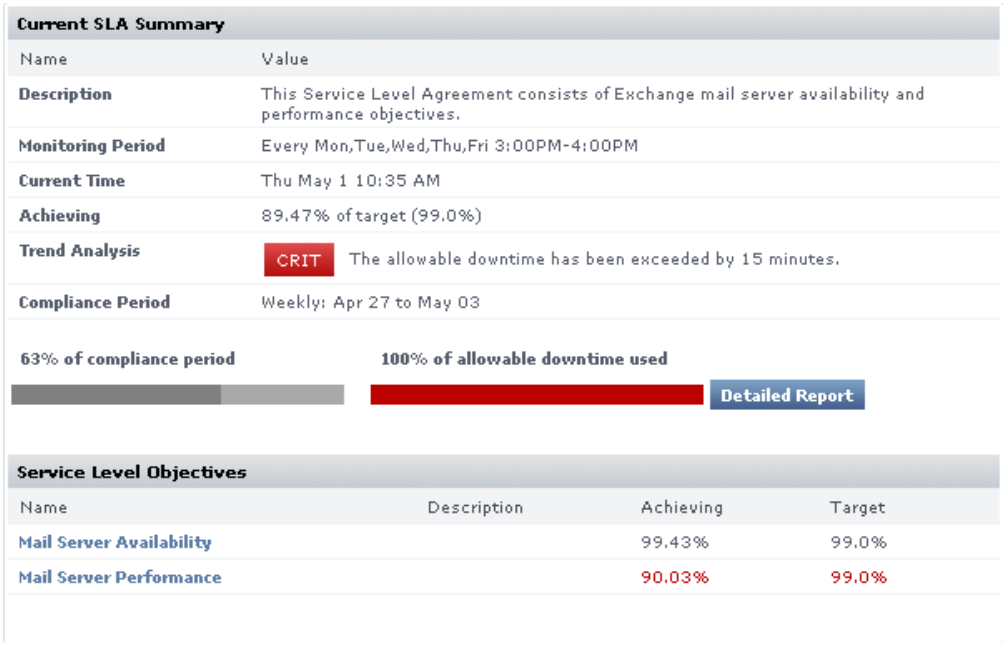



## A Note About SLOs and Compliance

It is important to note the role an SLO plays regarding SLA compliance: SLOs exist to help you conceptually separate services into logical groups that make it easier for you to monitor, diagnose, and set performance goals for them. Although the descriptions of "allowable downtime" in the previous section implied that service downtime affects SLA downtime, it is more accurate to say that service downtime affects SLO performance--which in turn, affects SLA downtime.

SLO outages affect reported SLA compliance in the same way service outages affect SLO compliance: allowable downtime is reduced when any outage is experienced. This is also pertinent if you are scanning the "Achieving" statistic for an SLA Summary. (This statistic can be viewed in the **Service Level Agreement** subpanel of **My Infrastructure**, by clicking the **Graphing** tab, then clicking **Current Status**.)

You can verify how well or poorly an SLA is achieving its target, but you can also view how the component SLOs are performing for the time period. In the following example, the email server performance SLO is achieving its 99.0% target. Although the email server availability SLO is achieving its target (99.43% vs. 99%), both SLOs' downtime affects SLA downtime. In this case, combined SLO downtime results in the SLA only achieving 89.47% of its target—resulting in a critical status.




See Viewing SLA Details for information on how to find information such as the Achieving statistic in an SLA summary.

# SLA-Creation Strategies

The key to an effective SLA is defining a service level that satisfies end users, yet is also attainable by IT staff and their systems configurations. This section covers the suggested steps to pinpointing this target service level:

- ensure service monitors exist for all SLA-related Elements (if you are a new up.time user, all of these will need to be created)
- define an SLA and its objectives
- use the SLA Detailed report to identify and resolve outages or underperforming Elements
- use the SLA Summary report to develop a baseline

## Setting Up and Gathering Data for Monitors

Determine which service monitors will best reflect the end-user experience, based on the aspect of your infrastructure that your SLA will cover. (See SLAs, Service Monitors, and SLOs for some sample SLAs and objectives.)

up.time users who do not have existing service monitors should create them and allow them to accumulate data for at least one week. Having historical data is essential to determining what level of service you should target.

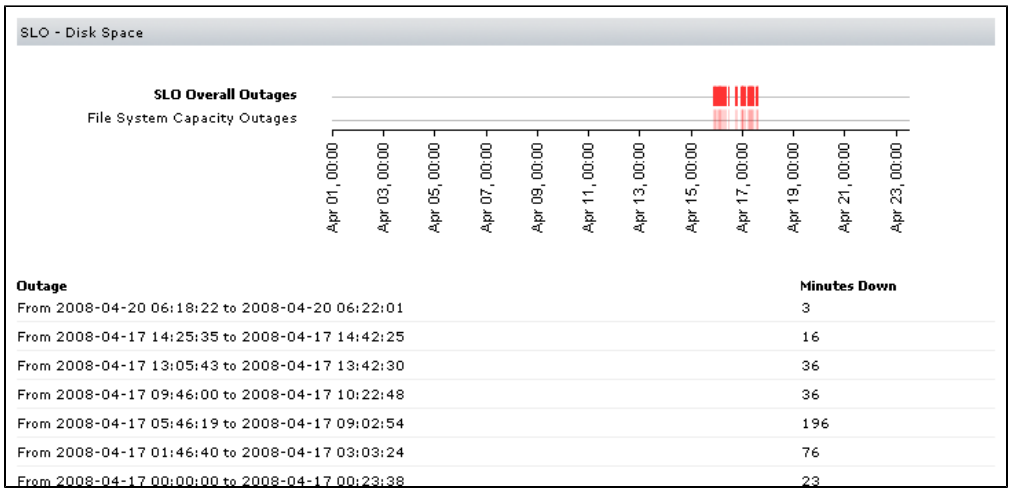
## Identifying Outages and Improvable Performance

When added to an SLA, service monitors that have been collecting data will immediately contribute to the SLA's reported status. For example, if all of an SLA's service monitors have a year's worth of historical data, creating a trial SLA will allow you to see how it would have performed over that last year. Having this historical data in SLA reports helps you analyze each component service monitor in the context of the SLA.

Consider a sample SLA called "System Performance" that is meant to ensure your application servers are not experiencing excessive loads; this can be indicated by CPU usage and disk space. The first service level objective is based on the Performance Check monitor for the application servers. A critical state occurs when CPU usage exceeds 90%. The second service level objective is based on the File System Capacity monitor. A critical state occurs when remaining disk space falls under 10%.

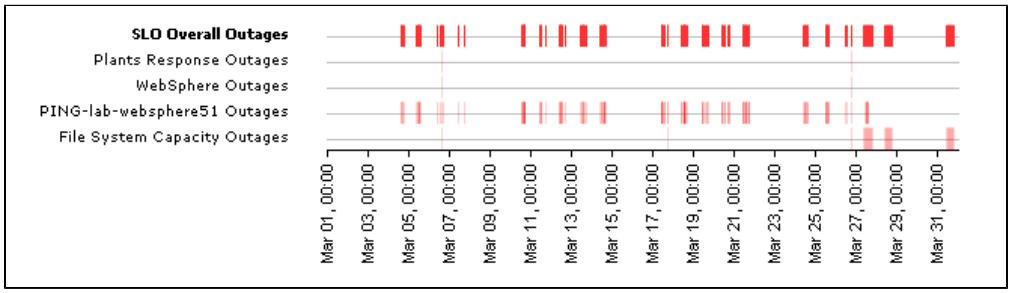
After creating an SLA based on these objectives, the SLA is immediately shown to be in a critical state—for the current Monitoring Period, one or both of the objectives have already failed to meet the defined service level:

You can investigate outages using the SLA Detailed report. In this example, you determine that the cause the SLA failure was a prolonged disk-space-related outage that, based on the outage graph, appears to have been resolved:




| Outage | Minutes Down |
|---|---|
| From 2008-04-20 06:18:22 to 2008-04-20 06:22:01 | 3 |
| From 2008-04-17 14:25:35 to 2008-04-17 14:42:25 | 16 |
| From 2008-04-17 13:05:43 to 2008-04-17 13:42:30 | 36 |
| From 2008-04-17 09:46:00 to 2008-04-17 10:22:48 | 36 |
| From 2008-04-17 05:46:19 to 2008-04-17 09:02:54 | 196 |
| From 2008-04-17 01:46:40 to 2008-04-17 03:03:24 | 76 |
| From 2008-04-17 00:00:00 to 2008-04-17 00:23:38 | 23 |

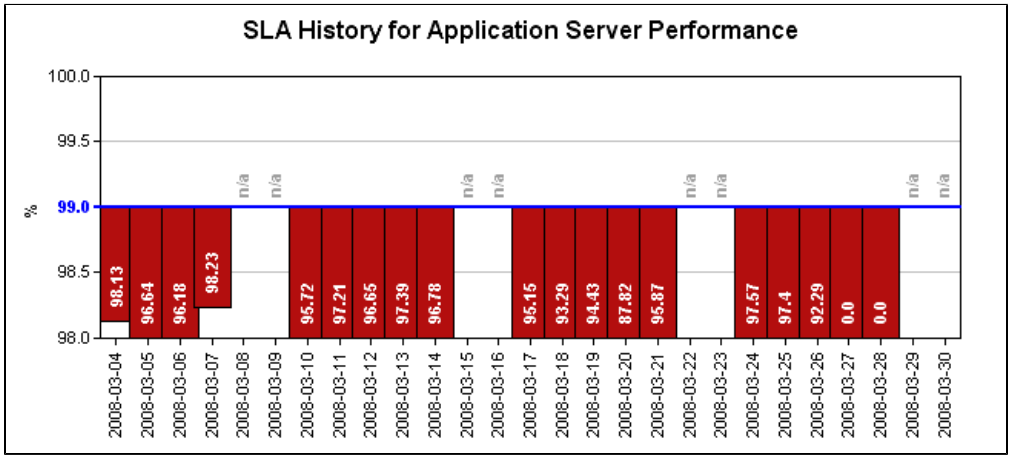
However, there may be cases were analyzing the SLA Detailed report will show intermittent outages that have not caused your trial SLA to fail, but represent underperforming services that should be optimized:

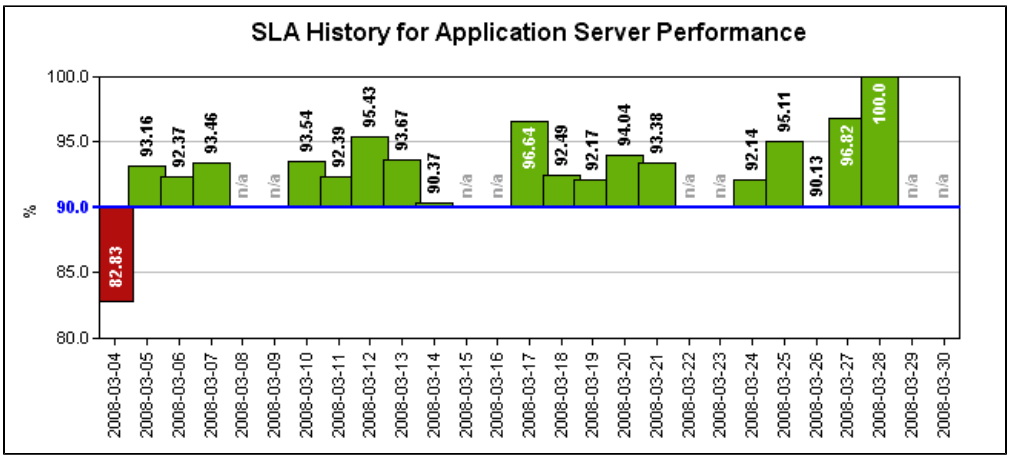



## Developing Baselines

After outages and underperforming systems have been addressed, use the SLA Summary report to compare test service levels to historical data.

Find a service level that is attainable. For example, in the SLA graph below, a 95% service level would be more realistic than the default 99% level, given the historical data. In the bottom SLA graph, although the 90% service level is compliant based on historical data, the performance history shows that a 95% service level is attainable if the IT department is able to isolate and improve key underperforming systems.






# Working with SLA Reports

up.time provides two types of SLA reports. The SLA Summary report provides high-level SLA compliance information, and the SLA Detailed report provides SLO- and service-level compliance information for system administrators.

See Reports for Service Level Agreements for more information.

# Adding and Editing SLA Definitions

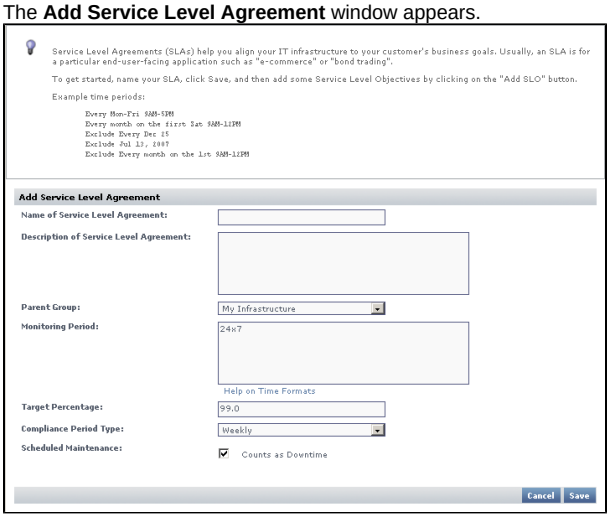
Adding and using an SLA requires that you first define the SLA, then add one or more SLOs to it.

> When you create an SLA, it will be inserted into the current compliance period. For example, a newly created SLA that reports over a monthly compliance period will, if created on the 15th of the month, already be around 50% through the period.

## Adding a Service Level Agreement

To add a service level agreement to up.time, do the following:

1. In the **My Infrastructure** panel, click **Add Service Level Agreement**.
   The **Add Service Level Agreement** window appears.



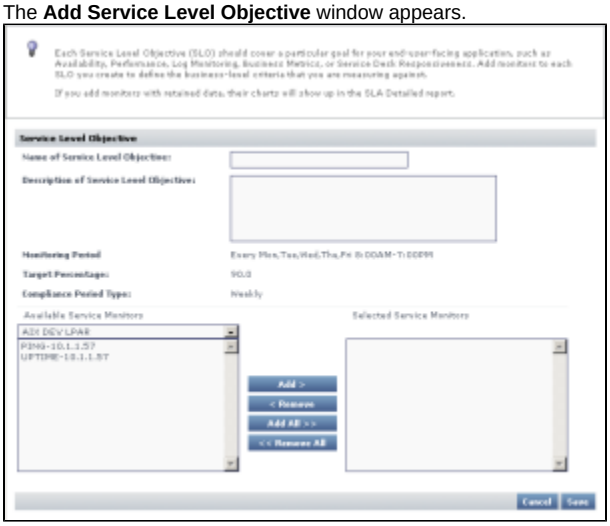

2. Enter a descriptive name for the SLA in the **Name of Service Level Agreement** field.
   This name will appear on both **My Infrastructure** and **Dashboards**.
3. Optionally enter a description for the SLA in **Description of Service Level Agreement** field.
   Although this step is optional, this description will appear in generated SLA reports; therefore, it is recommended that you provide a detailed description of the SLA including what it is meant to accomplish and of which SLOs it consists.
4. Optionally select the group of systems in your up.time environment with which this system will be associated from the **Parent Group** dropdown list.
   By default, the SLA is added to the **My Infrastructure** group.
   For more information on groups, see Working with Groups.
5. If it is not continuous (i.e., `24x7`), enter a **Monitoring Period** during which the SLA's compliance will be measured.
   You will need to create a time period definition (e.g., `Every Mon-Sat 8AM-6PM`). See Monitoring Periods and Time Period Definitions for more information.
6. If it is not the default 99.0%, enter a **Target Percentage** against which the SLA's compliance will be measured.
7. Ensure you have selected the correct **Compliance Period Type** from the dropdown list.
8. Indicate whether scheduled system maintenance will count as downtime.
9. Click **Save**.

Once saved, the SLA's **Service Level Agreement General Information** subpanel is displayed (see Viewing SLA Details for more information). From this page, you can add SLOs, as well as associate Alert Profiles and Action Profiles to the SLA.

## Adding Service Level Objectives to an SLA

To add a service level objective to an SLA, do the following:

1. In the **My Infrastructure** panel, click the name of the Service Level Agreement that you want to edit.
   The **Service Level Agreement General Information** subpanel appears.
2. Click **Add SLO**.
   The **Add Service Level Objective** window appears.



3. Enter a descriptive name for the SLO in the **Name of Service Level Objective** field.
   This name will appear anywhere in **My Infrastructure** and **Dashboards**.
4. Enter a description for the SLO in **Description of Service Level Objective** field.
   Although this step is optional, this description will appear in SLA Detailed reports; therefore, it is recommended that you provide a detailed description of the SLO including what goal is being accomplished, and of which service monitors it consists.
5. Add a service monitor that will be associated with the SLO by first selecting its host from the dropdown list, then adding the service monitor.
6. Continue to add service monitors to the SLO as required.
7. Click **Save**.

## Associating Alert and Action Profiles to an SLA

To add a service level objective to an SLA, do the following:

1. In the **My Infrastructure** panel, click the name of the Service Level Agreement that you want to edit.
   The **Service Level Agreement General Information** subpanel appears.
2. Associate Alert Profiles with the SLA by clicking **Edit Alert Profiles**.
3. In the **Alert Profile Selector** pop-up window, select one or more of the **Available Alert Profiles** from the list, then click **Save.**
4. If required, associate Action Profiles with the SLA by clicking **Edit Action Profiles**.
5. In the **Action Profile Selector** pop-up window, select one or more of the **Available Action Profiles** from the list, then click **Save**.

## Editing SLA and SLO Definitions

To edit a service level agreement, do the following:

1. In the **My Infrastructure** panel, click the gear icon beside the Service Level Agreement that you want to modify, then click **Edit**.
   The **Edit Service Level Agreement** window appears.
2. Edit the SLA as described in the previous section.
   See Adding a Service Level Agreement for information.
3. Since SLA reporting and monitoring is based on weekly or monthly compliance periods, changing any of the following on an existing SLA affects the reported SLA status and generated reports:
   - Monitoring Period
   - target percentage
   - compliance period type

> Any changes made are immediately reflected in any SLA reporting.

To edit a service level objective, do the following:

1. In the **My Infrastructure** panel, click the name of the Service Level Agreement that you want to modify, then click **Edit**.
   The **Service Level Agreement General Information** subpanel appears.
2. Click the SLO's corresponding Edit icon.
3. Edit the SLO as described in the previous sections.
   See Adding Service Level Objectives to an SLA for information.
   Since SLA reporting and monitoring is based on weekly or monthly compliance periods, changing the service monitors that make up an SLO definition will affect the reported SLA status and generated reports.

Any changes made are immediately reflected in any SLA reporting.