Determine the Right Sparing Levels to Meet Your Specific Uptime Needs

Sparing Strategies to Maximize Your Uptime

Overview

The ClearCube architecture enables unprecedented levels of availability and uptime that simply cannot be matched with distributed box PCs. The ClearCube service model of "switch and ditch" allows users to be switched to spares at the first sign of trouble. System administrators can then diagnose the problem and perform the repair or replacement offline - all without impacting the productivity of end-users.

Selecting the appropriate number and type of spare components is a key part of delivering optimized uptime levels for your users. This document recommends the right sparing levels to meet your specific uptime needs.

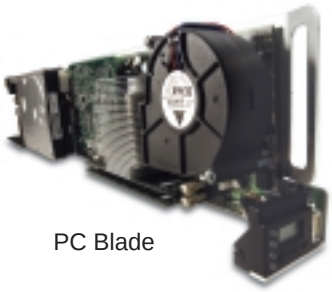
Spare Components

The ClearCube architecture is made up of modular, redundant components that have built-in fault tolerance. Units are easily swapped out in seconds and minutes instead of hours and days. When spare units are available, these swaps can be done very quickly to maximize your users' uptime. The key spare components that you should have available on-site for maximum availability include: Blades, Fan Trays, BackPacks, and User Ports.

PC Blades have fewer components to fail than box PCs (no peripherals with moving parts such as floppy drives and CD-ROMs). Also, PC Blades reside in the data center, a clean, stable and protected environment away from end users. This configuration dramatically improves reliability and enables ClearCube to achieve MTBF rates that are two to three times better than box PCs.

In the event of a software or hardware problem, PC Blades can be swapped to hot spares within seconds using the Blade Switching BackPack and Switch Manager software. The administrator can then remotely control the original PC Blade to diagnose and repair the problem offline - all without affecting user productivity.

A PC Blade can also be manually swapped with a cold spare PC Blade in less than one minute. Components that can affect a PC Blade are the



PC Blade

Cage Fan Tray

User Port

BackPack

usual suspects of PC failure, such as disk drives, power supplies and the blower for the processor. These items as well as processor temperature, airflow and other parameters are monitored by ClearCube Blade Manager software. This software can be configured to send alerts when thresholds are exceeded (even before full failure).

The **Cage Fan Tray** has built-in redundancy and when necessary can be replaced in minutes. If one fan stops the other three are sufficient to keep all the Blades cooled. Fan Tray status is monitored by Switch Manager software. If a fan fails, you can replace the entire fan tray with a spare fan tray without powering down any of the Blades - best of all you can schedule this swap out when you have time, since the system can run on three out of four fans.

The **BackPack** has dual redundant power supplies. If a power supply fails, the second can handle the complete load. Again, the power supply status is monitored by Switch Manager software. In this case, if a failure occurs on a power supply, you can schedule a BackPack replacement after hours when the PC Blades are not in use. The BackPack does not have to be replaced immediately because the backup power supply keeps the unit operational.

User Ports are the only ClearCube component on the users' desktops. These units have been designed with very high mean-time-between-failure (MTBF). This means that you will rarely need to go to the desktop to replace a User Port. However, in the event that you need to replace a User Port, having a spare onsite will minimize your users' downtime. Best of all, if you need to swap out a User Port, you will not need to power down or reboot the Blade - saving you time.

Recommended Sparing Ratios

The number of spares that you stock in your facility can effect your level of user uptime. In a basic office environment with task-based users, small amounts of user downtime may be acceptable. In environments where user downtime is costly, you want higher levels of availability. Finally, in mission critical environments such as military command centers and financial trading floors, every second counts. In these ultra-high availability environments, you will want to assure the highest possible levels of uptime.

The following guidelines suggest the number of spares for your application. These sparing levels are for every 100 users in your environment. For installations or locations where less than 100 users are present, use these guidelines as the minimum amount needed.

End-User Environment and Uptime Levels	Suggested Number of Spares per 100 Users				
	Hot (1) PC Blades	Cold (2) PC Blades	Fan Trays	BackPacks	User Ports
Basic Task-based Users >98% Uptime	2	1	1	1 (without RMC)	2
High-Availability Environments >99% Uptime	4	2	2	2 (1 with and 1 without RMC)	4
Mission-critical and Ultra-High Availability Environments >99.9% Uptime	12	3	2	3 (1 with and 2 without RMC)	5

1. “Hot” PC Blades are imaged, installed, powered-up and ready for switchover. 2. “Cold” PC Blades are spares that are on-site, but not powered-up / installed.