



## White Paper

# Service Capabilities of Autodesk Collaboration Services Operations Team

Autodesk® Buzzsaw™ and Autodesk Streamline™ are web-based project collaboration services for the building and manufacturing industries, respectively. This paper provides details about how our Operations Team's high level of professional service meets the needs of building and manufacturing users.

This paper covers the following topics:

- Technology and Environments
- Security
- Monitoring and Operational Practices
- Disaster Recovery

The Autodesk Collaboration Services Operations Team strives to deliver the best service possible. To achieve this, our first goal is to provide a solid systems framework. We continually perform architectural reviews to ensure that all systems are performing optimally. Our approach of layering applications on top of the stable Autodesk® ProjectPoint™ platform allows us to support additional industry-specific applications without significant changes to operational practices.

This layering approach can be seen in our systems infrastructure, security, monitoring, and operational practices.

## Technology and Environments

The Operations Team for the Autodesk Buzzsaw and Autodesk Streamline environments has developed an infrastructure that is

- Fully fault tolerant with no single point of failure
- Adaptable to increasing demand with no performance impact
- Stable because it is based on industry best practices

We apply these principles to all aspects of our infrastructure, for example:

- Mirroring of all network components such as firewalls, routers, load balancers, switches
- Load balancing of traffic over multiple web servers
- Instantaneous routing to backup servers if problems occur
- Multiple CPUs, power supplies, network connections, fan units, and so on for all servers

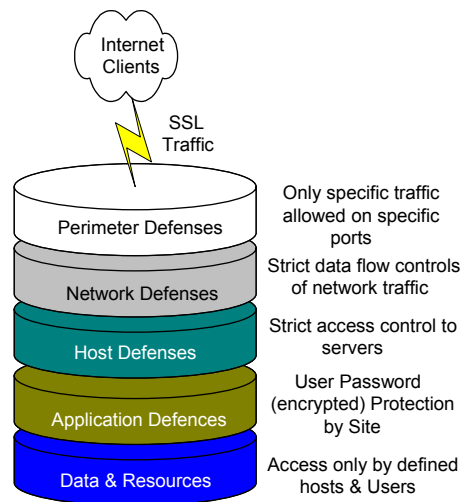
In addition to duplicating components at all levels, Autodesk uses only recognized leaders in hardware and software systems:

- Microsoft: Microsoft® Windows® 2000, SQL 2000 database, Internet Information Service
- HP (Compaq): ProLiant Intel Server series
- Cisco: Firewalls, routers, switches, and other network equipment
- Nortel: Alteon load balancers
- EMC: SAN and NAS data storage systems, data replication, and backup systems

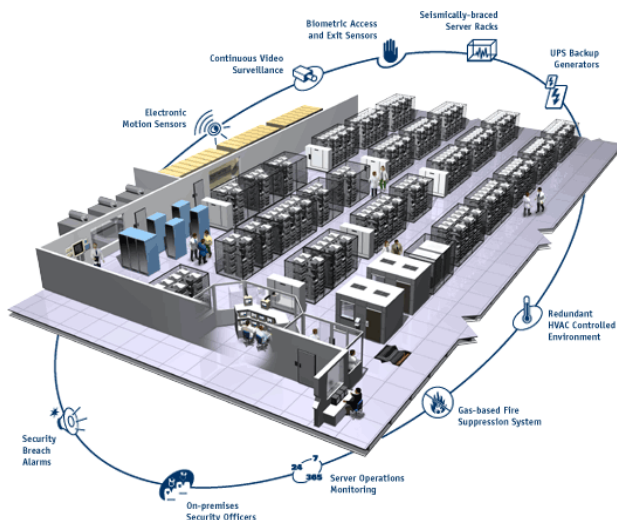
## Security

Autodesk has developed a multilayer approach to security. We use the following technologies and configurations:

- All data passed between the user's client and our systems is encrypted with Secure Sockets Layer (SSL) technology. Verisign registered certificates provide the encryption keys.
- Firewalls strictly control access to our servers from the Internet as well as our internal corporate networks.
- Within the data center infrastructure data flow, strictly defined rules ensure that only authorized communication occurs between systems.
- All servers are required to be at a defined level of security lockdown. This includes closing all unused layer 4 ports and ensuring that all servers have the latest security patches installed.
- Only application system accounts and Operation Team member accounts exist.



## Physical Access and Security



Cable & Wireless (Exodus) supplies our primary data center and provides security to our systems.

- Access list updated only by Autodesk's Operations Managers. Not even our own Operations Team has permanent access.
- Surveillance monitoring of facility and onsite security presence.
- Biometric access and exit scans.
- Fire suppression systems.
- Redundant backup power generation.

## Administrative and Remote Access

Access to administer systems is controlled by the following:

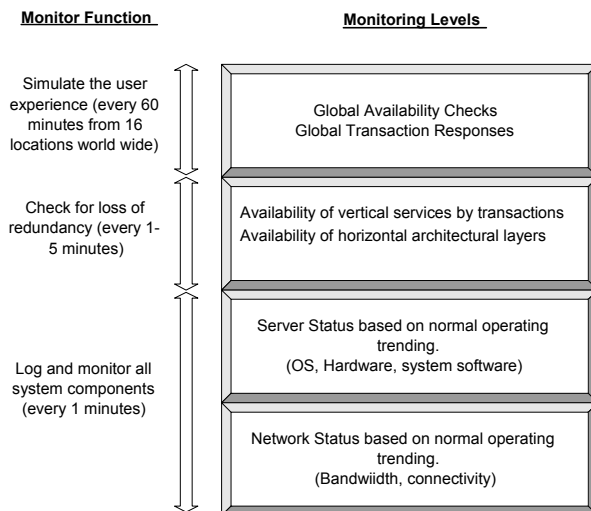
- Only Autodesk Operation Team members have Administrator accounts. Their activity is monitored and audited through firewall and system logs.
- Administrators can log in only from workstations with specific network IP addresses in the Autodesk office.
- When team members are remote (after normal hours) they can connect to the systems only through a dedicated VPN 3DES connection using a RSA SecurID token.

To ensure that Autodesk maintains this high level of security and to improve security in the future, we perform regular audits by

- Checking security logs for unusual activity
- Scanning all equipment for known security holes
- Checking patch levels on all equipment and software

## Monitoring and Operational Practices

Providing high levels of availability requires a comprehensive set of system monitors and operational practices. The aim is to predict problems and correct them before users are impacted or service is interrupted.



Autodesk performs all the standard checks normally associated with systems:

- Processor
- Memory
- Disk space
- Network traffic
- Software service active/inactive
- Interface status

This monitoring is carried out on

- Network equipment
- Server hardware
- Server software
- Storage systems

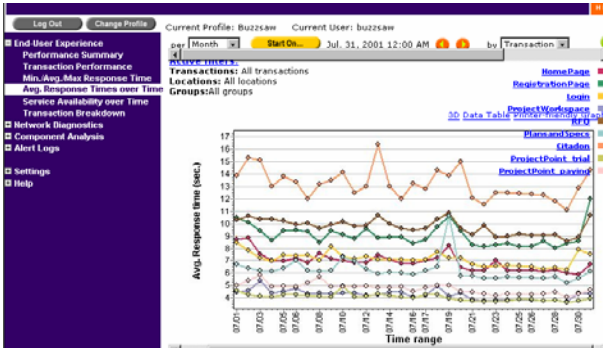
Based on the normal system operating parameters, we alert through a defined escalation procedure for any element outside the defined limits. Taking corrective action within 15 minutes, in conjunction with the redundant architecture, ensures that users are not affected.

Autodesk then analyzes this data to plot historical trends for capacity planning and proactive problem resolution. We use this information to predict the need to increase processing power on any tier of the architecture, increase bandwidth, allocate additional storage, and so on.

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In addition to monitoring, we also perform real transactions against our applications. There is no point in ensuring that all the systems are running if the application itself is not responding to users.

The timing and success of these transactions are monitored from one consistent location, and if the behavior goes outside our acceptable response, the escalation process for corrective action is activated.



We also monitor our applications from multiple locations throughout the world to identify what users are experiencing. Tracking the response of specific actions shows whether international users are having problems connecting to our server.

Because of the nature of the Internet, we may not be able to correct problems immediately; however, we can reliably inform users of problems so they can plan accordingly.

As with all parts of Autodesk CS Operations, monitoring alone cannot provide the reliability and availability users depend on, so it is essential to have a sound set of operational practices to support the services. We have in place routines and procedures for

- Incident management: All incidents (alerts) must be responded to and the impact, actions, and recommendations documented. Managers check and approve all incident reports.
- Problem management: Recurring incidents or identified problems are documented and allocated to the appropriate team for corrective action.
- Change management: All changes to systems must go through an approval process.
- Configuration management: Records are kept on all components within our environment.

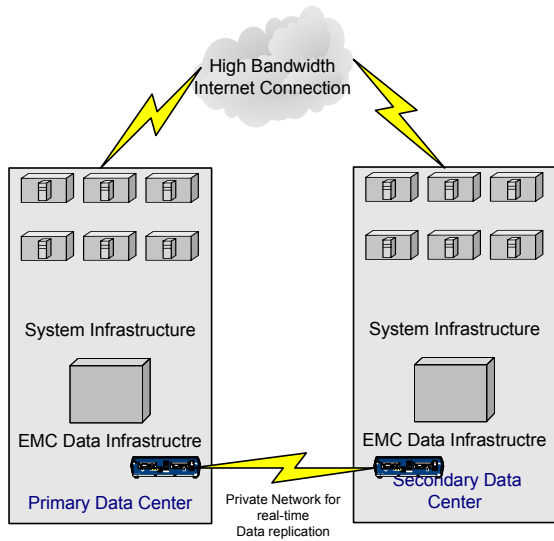
The CS Operations Team has based all processes on the IT industry best practices as defined in the ITIL Service Support Best Practices and is continually improving on them in accordance with these industry standards.

## Disaster Recovery

Although Autodesk has implemented redundancy at all levels within the infrastructure, there is always the possibility that our Primary Data Center will suffer a catastrophic event. In extreme cases, it is possible that the data in that data center could be destroyed.

To protect customer data in the event of a disaster, Autodesk has implemented a Business Continuity (Disaster Recovery) Data Center.

This data center is separated geographically from the primary data center with similar features of the Cable and Wireless facilities.



We have implemented a copy of our primary data center infrastructure; all network, server, data storage equipment; and software installation so that we can come online in that location to provide service.

To ensure that all user data is available, we replicate all data from the primary data center to the second location in real time. This ensures that all data entered into our systems before a disaster event will be available after recovery.

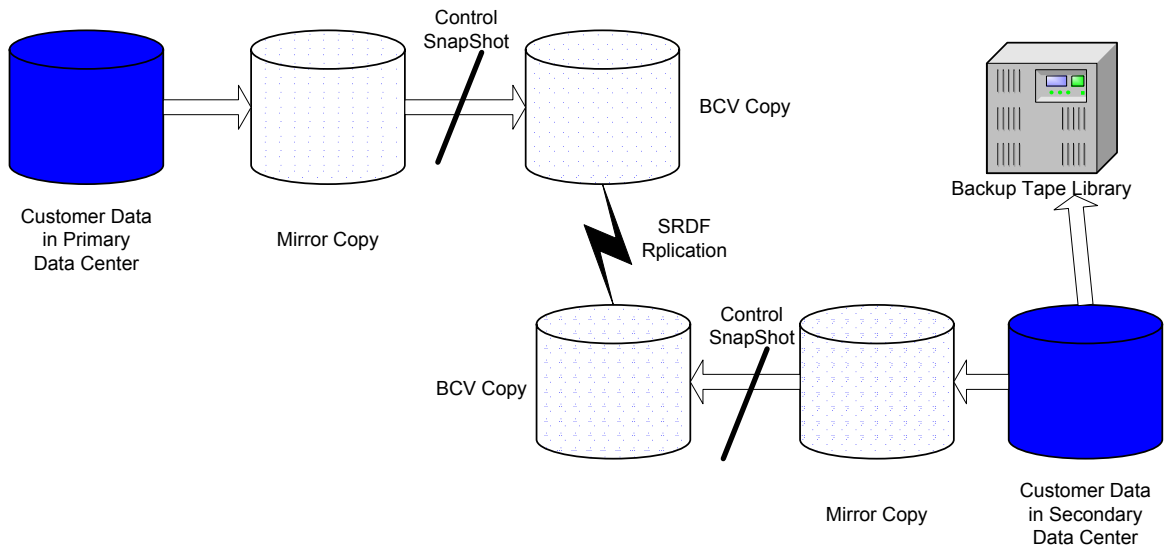
Autodesk uses EMC data storage technology, recognized as the leader in the field. We used both SAN and NAS technologies to access an EMC Symmetrix frame containing 16 terabytes of storage. The EMC Timefinder and Symmetrix Replication Data Facility

technologies then transfer data to a second 16-terabyte EMC Symmetrix frame.

We replicate more than five terabytes of user data between the two locations. This requires that we first mirror data within the main frames. In addition, another five terabytes is used to take point-in-time snapshots of all user data, resulting in an instantaneous backup.

This data is then synchronized with the remote data storage, and after being placed in arrangement there, is copied to tape using EMC's EDM product and an ATL 3000 tape library.

The tapes are then taken offsite on a daily basis on a three-month rotation.



## Glossary

**Cluster:** Two or more servers that are connected in a manner that allows the seamless transfer of processing in the event of a fault.

**Load Balancing:** A network device used to evenly divert system or user requests to multiple servers for processing. To the user or system they appear to be one system.

**SAN (Storage Area Network):** A network that directly attaches large storage systems to database or file servers using a private high-speed network (in Autodesk's case, a dedicated high-speed fiber-optic network).

**NAS (Network Attached Storage):** Allows large storage systems to be accessed through common network file-sharing methods (Windows file share). Autodesk uses dedicated data servers to allow connection into high-speed fiber-optic storage networks used by the SAN.

**Firewall:** A combination of hardware and software, located at the perimeter of a network, that protects resources from users in other networks.

**BCV (Business Continuance Volume):** Technology used within the EMC storage system to make almost instantaneous copies of large quantities of data (terabytes) without affecting systems or users.

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