Important Information
This document provides ICS administrators information they need to understand how ICS servers operate in a cluster so they can monitor services and when necessary maintain cluster nodes in cases of service or hardware failure.

Visit the ICS 1.3 Landing Page on the Avid Knowledge Base to get the latest versions of all ICS documentation (including this article)—updates are occasionally issued after initial release.


Note: Interplay MAM does not support ICS 1.3 for video playback. Interplay MAM 4.0.10, 4.1.2, and 4.2 require ICPS 1.2.5. Interplay MAM will support ICS for video playback in a future ICS release.
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Overview

Interplay Common Services (ICS) is a collection of software services running on a server to provide web-based and mobile application interfaces and video playback to Avid Solutions including Interplay Central, Interplay Sphere, and Interplay MAM.

In cases where redundancy and/or additional capacity is required from ICS, servers can be clustered.

This document provides an inventory of ICS services along with instructions on how to interact with them for maintenance purposes. Additionally, it explains the specifics of an ICS cluster, how each service operates in a cluster, and provides guidance on best practices for an administrator of an ICS cluster.

About ICS Services

7 primary services run concurrently on an ICS server to provide application interfaces and video playback for Interplay Central, Interplay Sphere, and Interplay MAM.

Which Services Run on an ICS Server?

Of the 7 services, 4 are Interplay Common Services, and 3 are third-party (open source) services. All services are always installed and running no matter which Avid solution is connecting to ICS, although where Interplay Central uses all 7 services, Interplay Sphere and Interplay MAM use only 6 of them.

Note: With future releases additional services will be introduced.

The following table lists primary services and their use. Other services are running on the server but the following 7 are key components of an operational ICS server.

<table>
<thead>
<tr>
<th>Service</th>
<th>ICS or 3rd Party</th>
<th>Interplay Central</th>
<th>Interplay Sphere</th>
<th>Interplay MAM</th>
</tr>
</thead>
<tbody>
<tr>
<td>postgresql</td>
<td>3rd Party</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>activemq</td>
<td>3rd Party</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>httpd</td>
<td>3rd Party</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>avid-ums</td>
<td>ICS</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>acs-ctrl-core</td>
<td>ICS</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>avid-all</td>
<td>ICS</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>avid-interplay-central</td>
<td>ICS</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

What About Gluster?

Gluster (specifically, glusterd) is a service that is optionally installed and configured for ICS:
• Gluster is only installed for ICS clusters—deployments with a single ICS server never require Gluster.
• Gluster is only required in ICS clusters in two scenarios:
  o For Interplay Central, when the Interplay Central iOS app is deployed—ICS caches the video files it generates and caches for the iOS app. Gluster makes caching files across the cluster more efficient.
  o For Interplay MAM, when browse proxy formats other than MP4 (h.264) are in use—ICS transcodes these files for file-based playback to FLV and caches them. Gluster makes caching files across the cluster more efficient.

Gluster cache replication is unrelated to ICS service clustering, high-availability, and load balancing. If your cluster has Gluster installed and configured, you do not have to worry about starting or stopping Gluster when interacting with ICS services or its cluster management utility, Corosync.

If you remove a node from the cluster, Gluster itself continues to run and continues to replicate its cache against other nodes in the Gluster group. If you power down the node for maintenance reasons, it will re-synchronize and ‘catch up’ with cache replication when it is rebooted.

**ICS Service Maintenance**
These services can be started and stopped, and you can check the status of these services by logging into a server as root and using standard Linux service commands.

**When Do I Interact Directly with ICS Services?**
When troubleshooting issues on a server (a standalone server or a node that you have removed from a cluster for maintenance purposes) directly interacting with services is sometimes required. In some cases incorrectly completing some installation and configuration procedures may require you to back up and redo the procedure. In order for it to take hold, restart the corresponding service or services.

If a server is a member of a cluster you should avoid interacting with services directly. The cluster management utility manages services across nodes and if you interact with them independently your actions may conflict with what the cluster expects and result in unwanted failover.

**How Do I Interact Directly with ICS Services?**
The command line for interacting with services is simple to use. Its syntax is:

```
service <resource> <action>
```

...where `<resource>` is the name of the service you want to interact with (e.g. `avid-all`) and `<action>` is the action you want to take on that service.
Resources:

<table>
<thead>
<tr>
<th>Resource</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>postgresql</td>
<td>The database in which ICS settings and user data is stored</td>
</tr>
<tr>
<td>activemq</td>
<td>The message bus used as an integration layer between services</td>
</tr>
<tr>
<td>httpd</td>
<td>Apache web server used by the video playback service</td>
</tr>
<tr>
<td>avid-ums</td>
<td>The Interplay Central user management service</td>
</tr>
<tr>
<td>acs-ctrl-core</td>
<td>Controls the boot server, settings, and configuration</td>
</tr>
<tr>
<td>avid-all</td>
<td>The Interplay common playback service</td>
</tr>
<tr>
<td>avid-interplay-central</td>
<td>The Interplay Central middleware application server</td>
</tr>
</tbody>
</table>

Actions:

<table>
<thead>
<tr>
<th>Action</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>stop</td>
<td>Stops the service</td>
</tr>
<tr>
<td>start</td>
<td>Starts the service</td>
</tr>
<tr>
<td>restart</td>
<td>Stops then starts the service</td>
</tr>
<tr>
<td>status</td>
<td>Returns the current status of the service</td>
</tr>
</tbody>
</table>

For example, to restart the Interplay Central user management service, type:

```
service avid-ums restart
```

**Can I Restart Services in Any Order?**

ICS services have dependencies on each other that require starting them in a particular order. If you have a server and stop all services, this is the order in which you must restart them:

1. `postgresql`
2. `avid-ums`
3. `activemq`
4. `httpd`
5. `acs-ctrl-core`
6. `avid-all`
7. `avid-interplay-central`

This service order is important in cases where all services are already running and you have to restart one of them—the downstream services must be stopped and then restarted in the correct order. For example, if you need to restart `httpd (#4)`, you must first stop `avid-interplay-central (#7), avid-all (#6), and acs-ctrl-core (#5)`, then restart `httpd (#4)`, then start `acs-ctrl-core (#5), avid-all (#6), and avid-interplay-central (#7)`, in that order.
About ICS Server Clustering

In order to obtain high-availability and/or additional capacity, multiple ICS servers can be clustered.

What is a Cluster?

A cluster is a collection of servers that have ICS installed and configured to appear to the outside world as a single server. Where a single server has its host name and IP address used by, for example, Interplay Central users to connect using a web browser, a cluster has a virtual IP address (and a corresponding host name). Interplay Central users point to the cluster in the browser’s address bar and the cluster redirects the connection request to one of the servers in the cluster.

High-Availability and Load Balancing

A server cluster provides redundancy via high-availability of services. That is, if a service fails on one node it is swiftly restarted, and if it cannot be restarted it moves to another node on the server. All ICS services are redundant in this way.

Additional capacity is obtained via load balancing. In this case a service runs on all nodes in the cluster concurrently, and incoming requests to use that service are distributed evenly across all nodes in the cluster.

In the case of ICS, it is important to know that while all services have high-availability, only the video playback service is load balanced. This means that in a cluster there is a master node that runs all 7 services. All incoming requests come to this node and are serviced by it. Should any of the services fail on this node without recovery, the node will be automatically taken out of the cluster and another node in the cluster will take over as master. At all times however, video playback requests are distributed across all nodes in the cluster.

What is Corosync?

Corosync is a 3rd party cluster management utility used by ICS. You set up a Corosync cluster as per instructions in the Avid ICS 1.3 Installation & Configuration Guide, and generally speaking there is little need to interact directly with Corosync.

Of the 7 primary services used by ICS described in this document, only 4 of them are controlled by Corosync. But Corosync has some additional processes it controls.

Services Not Managed by Corosync

Some services are persistent on all nodes and Corosync does not manage them. They run actively on all nodes and should always be running. These services include:

- postgresql
- activemq
- httpd
**Services Managed by Corosync**
The following services are managed by Corosync:

- avid-ums
- acs-ctrl-core
- avid-all
- avid-interplay-central

These services are managed by Corosync to obtain high-availability. *avid-all* is active on all nodes; *avid-ums, acs-ctrl-core, and avid-interplay-central* are active only on the cluster’s master node. Should they fail, Corosync restarts them. If services fail to restart or if they fail a second time, the node is identified as unstable and is removed from the cluster. Corosync makes another node in the cluster the new master node.

Again, in the specific case of video playback requests (which use the *avid-all* service), all nodes are active and playback requests are distributed evenly across all nodes to obtain load balancing.

*Note: Load balancing is not controlled by Corosync, but rather another Avid service called XLB. There is no need to interact directly with XLB.*

**Additional Corosync Activity**
Corosync also manages the following processes to provide high-availability:

<table>
<thead>
<tr>
<th>Cluster IP</th>
<th>Corosync maintains the virtual cluster IP on all nodes in case a master node fails and another needs to pick up on cluster IP requests.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Service Startup</strong></td>
<td>Corosync starts services on all nodes when you initially create or restart the cluster.</td>
</tr>
<tr>
<td><strong>PostgreSQL Replication</strong></td>
<td>Corosync replicates the PostgreSQL database across all nodes in case a master node fails and another needs to take its place.</td>
</tr>
</tbody>
</table>

**How Do I Interact with Corosync?**
Although Corosync manages services, it is a service itself. You can interact with Corosync via the command line. Its syntax is:

```
service corosync <action>
```

...where `<action>` is the action you want to take on Corosync.

**Actions:**

<table>
<thead>
<tr>
<th>command</th>
<th>description</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>stop</em></td>
<td>Stops the service</td>
</tr>
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<td><em>start</em></td>
<td>Starts the service</td>
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<td><em>restart</em></td>
<td>Stops then starts the service</td>
</tr>
<tr>
<td><em>status</em></td>
<td>Shows the current status of the service</td>
</tr>
</tbody>
</table>
ICS 1.3 Server Clustering Overview

Log in to a cluster node and use this command to start, stop, or restart Corosync on that node. Stopping Corosync stops all ICS services and removes the node from the cluster. Do this if the node requires maintenance while other nodes are active in the cluster. Starting Corosync returns the node to the cluster and starts all ICS services in the proper order.

ICS Failover
This section describes service failover behavior and provides an example scenario.

Playback Service Failure
Of all the services on an ICS server, the avid-all playback service is unique in two ways:

- It is active on all nodes and playback requests are distributed across all nodes.
- Its fail-count threshold is high. avid-all can fail on a node several times and it is repeatedly restarted without triggering failover to another node.

As a user, if you are playing video and the playback service instance for your session fails, the service is immediately restarted on that node and in most cases you will see no more than a brief playback glitch.

All Other Services
For other services, there are three categories:

- Required persistent services that are not managed by Corosync. These include postgresql, activemq, and httpd, which rarely fail. If they do fail, they will result in managed services failing, which will in turn result in Corosync detecting a failed node and the node being removed from the cluster.
- Required persistent services that are managed by Corosync. These include avid-ums, acs-ctrl-core, and avid-interplay-central. If these services fail, they are restarted once and their fail-count goes to 1. If they fail again, Corosync deems the node as unstable and removes the node from the cluster, assigning another node as the master node.

Example Failover Scenario
In this scenario the Interplay Central user management service fails twice and another node in the cluster takes over as master node.

1. A user is connected to Interplay Central, assembling a shot list using the Media Logger.
2. The avid-ums service on the cluster’s master node fails.
3. Corosync restarts it successfully. Its fail-count is set to 1.

   While the service restarts (for about 10 seconds) other users will not be able to log into Interplay Central. The user creating the shot list will not be affected. If other users currently logged in are attempting to change their user settings those operations will fail until the user management service restarts.

4. Several days later, avid-ums fails again.
5. Corosync sees that its fail-count is set to 1, so it:
   - Sets the avid-ums fail-count on that server to 2
ICS 1.3 Server Clustering Overview

- Deems the master node unstable and removes the node from the cluster
- Assigns another server in the cluster as master
- An e-mail is sent to the administrator indicating a service failure and failover has occurred

In this case, while the failover process occurs, no users will be able to log into Interplay Central. All currently logged in users will be disconnected. If they leave the browser alone and wait approximately 20-30 seconds, their session will reconnect with no loss of data. If they close the browser or leave the page, they will have to log in again and any unsaved changes are lost.

**ICS Administrator Best Practices**

Under most conditions with a cluster, Corosync does most of the work for an ICS administrator by restarting managed services and sending e-mails when a node has been removed from the cluster. If a service has reached a fail-count of 2 and a server is removed, that server should be examined.

In the case of a pure software failure the administrator can simply clear the fail-count and add the server back into the cluster. But the node may have failed because of a lack of disk space or a hardware failure, in which cases it should only be added to the cluster after it has been repaired.

The following sections provide guidance for an ICS cluster administrator.

**Sync Server Clocks**

For a cluster to behave as expected it is important that the clocks for each node are synchronized. For more information see the [Avid ICS 1.3 Installation & Configuration Guide](#).

**Check Your E-mail**

Make sure ICS is configured to send you e-mails when Corosync detects service failures. For instructions, see the [Avid ICS 1.3 Installation & Configuration Guide](#). If you receive an e-mail reporting a failover, attend to the cluster immediately. The offending node will have been removed from the cluster, so getting it operational and back in the cluster is a priority.

In a properly sized cluster, a single node can fail and the cluster will still be able to properly service its users. However, if 2 nodes fail, the cluster is probably under provisioned for expected use and will be oversubscribed.

**Check Cluster Status Regularly**

If a service fails once, it is immediately restarted on the server and its fail-count is set to 1. No e-mail is sent in this case. A second failure of the same service will result in a failover occurring.

In most cases service failures are benign, and the automated restart is sufficient. You may want to monitor cluster status regularly. If services on some nodes are occasionally reporting a fail-
count of 1, take some initiative to verify that server hardware is OK, that disk space is not compromised. You can even look at the time of the failure and retrieve logs.

If it appears to be a benign service failure, reset the service’s fail-count. That way if it fails again it will restart without triggering a failover.

To reset a service’s fail-count:

1. Log into the server as root.
2. Check the status of services on the node. Type:

   `crm_mon -f`

This command returns something like the following.

```
============
Last updated: Thu Jan 10 10:42:23 2013
Last change: Wed Jan 9 10:27:18 2013 via cibadmin on ics-hp1
Stack: openais
Current DC: ICS-hp1 - partition with quorum
Version: 1.1.6-3.el6-a02c0f19a00c1eb2527ad38f146ebc0834814558
2 Nodes configured, 2 expected votes
13 Resources configured.
============

Online: [ ics-hp1 ics-hp2 ]

Clone Set: AvidConnectivityMonEverywhere [AvidConnectivityMon]
  Started: [ ics-hp2 ics-hp1 ]
AvidClusterIP (ocf::heartbeat:IPaddr2):   Started ics-hp2
AvidClusterMon (lsb:avid-monitor):   Started ics-hp2
Clone Set: AvidClusterDbSyncEverywhere [AvidClusterDbSync]
  Started: [ ics-hp2 ics-hp1 ]
Clone Set: pgsqIDBEverywhere [pgsqIDB]
  Started: [ ics-hp2 ics-hp1 ]
Clone Set: AvidAllEverywhere [AvidAll]
  Started: [ ics-hp2 ics-hp1 ]
AvidIPC (lsb:avid-interplay-central):   Started ics-hp2
AvidUMS (lsb:avid-ums): Started ics-hp2
AvidACS (lsb:acs-ctrl-core):   Started ics-hp2

Migration summary:
* Node ics-hp1:
  * Node ics-hp2:
    AvidACS: migration-threshold=2 fail-count=1
```

The output of this command indicates which services are being controlled by Corosync and which nodes they are running on. Notice also that while all services are running on one node (ics-hp2), only some of the services are running on the other (ics-hp1). This is because ics-hp2 is the master node. ics-hp1 only runs database replication and video playback services.
Additionally, the foregoing example reports a fail-count for AvidACS (avid-ctrl-core) of 1, which means that it failed and was restarted. Should it fail again, Corosync will remove this node from the cluster and use another node as the master.

3. If investigation determines that this was a benign service failure, you can reset the fail-count of this service to zero. Type:

   `crm resource failcount <resource> set <hostname> 0`

   ...where `<resource>` is the name of the resource for which you want to reset the failcount:

   - AvidACS (avid-ctrl-core)
   - AvidUMS (avid-ums)
   - AvidIPC (avid-interplay-central)
   - AvidAllEverywhere (avid-all)

   ...and where `<hostname>` is the hostname of the node on which the service is running.

   For example:

   `crm resource failcount AvidACS set ics-hp2 0`

ICS Cluster Troubleshooting

Most service failures result in an immediate service restart on the same node in the cluster. In this case, users generally do not notice the failure—at worst their attempts to interact with the service in question may return errors for a few seconds but the full functionality will resume with no data loss.

If a service fails for a second time on a node and forces the removal of that node from the cluster, users will be impacted by a system that returns errors until the new master node takes over. This can take 20-30 seconds, and if a user loses patience and leaves the page or closes the browser they will lose unsaved changes.

Most service failures are due to software issues, and in this case services reliably restart or failover to another node in the cluster. The most seamless recovery is a service restart on the same node, so we strongly encourage administrators to monitor their cluster regularly for a fail-count instance and—following confirmation that from a hardware perspective, the server is OK—reset the fail-count.

In more extreme cases, failover can either take a long time, or not happen at all. The following table describes the symptoms of an unresponsive cluster, possible causes, and recovery steps in each case.

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Possible Cause</th>
<th>Recovery Steps</th>
</tr>
</thead>
<tbody>
<tr>
<td>Some or all existing connections lost—no video playback, application</td>
<td>Master node unexpectedly but properly reboots, triggers failover, but</td>
<td>Stop the cluster, reboot nodes, reset fail-count for all services, restart</td>
</tr>
<tr>
<td>interface unresponsive for more than 5 mins. Unable to login new session.</td>
<td>services do not start properly.</td>
<td>cluster.</td>
</tr>
<tr>
<td>Temporary power loss to</td>
<td></td>
<td></td>
</tr>
<tr>
<td>master node triggers failover, but services do not start properly</td>
<td>Stop the cluster, power down all nodes. Consult network administrator to repair network. Reboot nodes, reset fail-count for all services, restart cluster.</td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>Network failure (cable disconnected/severed, or other general network failure).</td>
<td>Stop the cluster, power down all nodes. Consult network administrator to repair network. Reboot nodes, reset fail-count for all services, restart cluster.</td>
<td></td>
</tr>
<tr>
<td>System disk drive is full.</td>
<td>Stop the cluster, investigate the system disk and remove files to make space, reboot nodes, reset fail-count for all services, restart cluster.</td>
<td></td>
</tr>
</tbody>
</table>
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