

Subj: IPP/JMP job-state and job-state-reasons agreements
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Date: 9/197/97
File: statreas.doc

This document reflects the agreements reached on the job-state semantics of the 'canceled' and 'aborted' states and the associated job state reasons for IPP and JMP after reviewing the 9/17/97 version at the 9/17 IPP and 9/19 JMP meetings. In addition to the changes listed in Ron's list, the JMP agreed to remove the finishing enums that IPP removed (because of a lack of a coordinate system specification for stapling), add private enum range for attributes to agree with IPP.

The agreement was to change the 'canceled' and 'aborted' job states to be entered when the job was finished being canceled, rather than as a response to the CancelJob operation, and the 'aborted' state when the system had finished being aborted.
All of the job state reasons for IPP and JMP are included for review.

On the JMP DL, Harry has made the following proposals for movement of some job state reasons to jmJobStateReason1 object and clarifications.
Some of these may want to be added to IPP (but IPP can remain a subset of JMP, since JMP is attempting to cover other job submission protocols as well as IPP).

1. Move 'submssionInterrupted' to jmJobStateReasons1 to indicate that the server has timed out the job and closed it.
Should be added to IPP as well.
2. Move 'serviceOffLine" to jmJobStateReason1 to indicate that the service has been disabled, so that all pending jobs are not going to be processed. Should be considered for addition to IPP as well.
3. Distinguish between canceling by (authenticated) operator and canceled at local (unauthenticated) op panel, by adding 'canceled-at-device'.
4. Clarify 'canceled-by-user' to include job owner and any other authorized end-user.
5. Clarify 'canceled-by-operator' to mean authenticated as a privileged user in some way.

6. Add 'jobInterpreting', 'jobQueued', and 'jobTransforming' to JMP to align with the recent additions to IPP "job-state-reasons". Only the 'jobInterpreting' is to be included in the jmJobStateReasons1 object.

If we add these to JMP, Harry has indicated that we could put them in their logical place in the order of likely occurrence, but only we need to agree quickly. If we can't agree quickly, then we should put them at the end of the bit assignments in JMP. (Fortunately, in IPP, we use keywords, instead of bits, so there is no problem with ordering).

ISSUE: Add jobURI as an attribute to JMP? (See below)

The proposed specs for each of these job states and job state reasons becomes:

For JMP:

```

JmJobStateTC ::= TEXTUAL-CONVENTION
    STATUS          current
    DESCRIPTION
        "The current state of the job (pending, processing,
        completed, etc.).
  
```

The following figure shows the normal job state transitions:

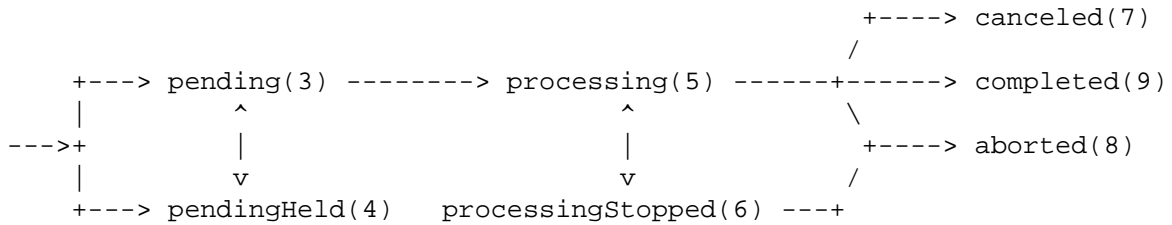


Figure 1 - Normal Job State Transitions

Normally a job progresses from left to right. Other state transitions are unlikely, but are not forbidden. Not shown are the transitions to the **canceled** state from the **pending**, **pendingHeld**, **processing**, and **processingStopped** states.

Jobs in the **pending**, **processing**, and **processingStopped** states are called 'active', while jobs in the **pendingHeld**, **canceled**, **aborted**, and **completed** states are called 'inactive'. Jobs reach one of the three terminal states: **completed**, **canceled**, or **aborted**, after the jobs have completed all activity, and all MIB objects and attributes have reached their final values for the job.

These values are the same as the enum values of the IPP 'job-state' job attribute. See Section **Error! Reference source not found.**

unknown(2),

The job state is *not* known, or its state is indeterminate.

pending(3),

The job is a candidate to start processing, but is not yet processing.

pendingHeld(4),

The job is not a candidate for processing for any number of reasons but will return to the **pending** state as soon as the reasons are no longer present. The job's **jmJobStateReasons1** object and/or **jobStateReasonsN** (N=2..4) attributes SHALL indicate why the job is no longer a candidate for processing. The reasons are represented as bits in the **jmJobStateReasons1** object and/or **jobStateReasonsN** (N=2..4) attributes. See the **JmJobStateReasonsNTC** (N=1..4) textual convention for the specification of each reason.

processing(5),

One of Either:

1. the job is using, or is attempting to use, one or more ~~document transforms which include (1)~~ purely software processes that are analyzing, creating, or interpreting a PDL, etc., and (2)

2. the job is using, or is attempting to use, one or more hardware devices that are interpreting a PDL, making marks on a medium, and/or performing finishing, such as stapling, etc.,.

OR

~~3~~2. (configuration 2) the server has made the job ready for printing, but the output device is not yet printing it, either because the job hasn't reached the output device or because the job is queued in the output device or some other spooler, awaiting the output device to print it.

When the job is in the **processing** state, the entire job state includes the detailed status represented in the device MIB indicated by the **hrDeviceIndex** value of the job's **physicalDevice** attribute, if the agent implements such a device MIB.

Implementations MAY, though they NEED NOT, include additional values in the job's **jmJobStateReasons1** object to indicate the progress of the job, such as adding the **jobPrinting** value to indicate when the device is actually making marks on a medium and/or the processingToStopPoint value to indicate that the server or device is in the process of canceling or aborting the job.

processingStopped(6),

The job has stopped while processing for any number of reasons and will return to the **processing** state as soon as the reasons are no longer present.

The job's **jmJobStateReasons1** object and/or the job's **jobStateReasonsN** ($N=2..4$) attributes MAY indicate why the job has stopped processing. For example, if the output device is stopped, the **deviceStopped** value MAY be included in the job's **jmJobStateReasons1** object.

NOTE - When an output device is stopped, the device usually indicates its condition in human readable form at the device. The management application can obtain more complete device status remotely by querying the appropriate device MIB using the job's **deviceIndex** attribute(s), if the agent implements such a device MIB

canceled(7),

A client has canceled the job and ~~the job is either: (1) in the process of being terminated by~~ the server or device ~~or (2) has completed~~ canceled the job and all MIB objects and attributes have reached their final values for the job ~~terminating~~. While the server or device is canceling the job, the job's **jmJobStateReasons1** object SHOULD contain the **processingToStopPoint** value and one of either the **canceledByUser**, **or canceledByOperator**, **or canceledAtDevice** values. The **canceledByUser**, **canceledByOperator**, **or canceledAtDevice** values remain while the job is in the **canceled** state.

aborted(8),

The job has been aborted by the system, usually while the job was in the **processing** or **processingStopped** state and the server or device has completed aborting the job and all MIB objects and attributes have reached their final values for the job. While the server or device is aborting the job, the job's **jmJobStateReasons1** object MAY contain the **processingToStopPoint** and **abortedBySystem** values. If implemented, the **abortedBySystem** value SHALL remain while the job is in the **aborted** state.

completed(9)

The job has completed successfully or with warnings or errors after processing and all of the media have been successfully stacked in the appropriate output bin(s). The job's **jmJobStateReasons1** object SHOULD contain one of: **completedSuccessfully**, **completedWithWarnings**, or **completedWithErrors** values."

REFERENCE

"This is a type 2 enumeration. See Section **Error!**
Reference source not found.."

```
SYNTAX      INTEGER {
    unknown(2),
    pending(3),
    pendingHeld(4),
    processing(5),
    processingStopped(6),
    canceled(7),
    aborted(8),
    completed(9)
}
```

+++++
+ Job Identification attributes
+
+ The following attributes help an end user, a system
+ operator, or an accounting program identify a job.
+++++

jobURI(20), OCTET

STRING(SIZE(1..255))

OCTETS: The job's Universal Resource Identifier (URI)
[RFC-1738]. See IPP for example usage.

NOTE - The agent may be able to generate this value on
each SNMP Get operation from smaller values, rather than
having to store the entire URI.

If the URI exceeds 255 octets, the agent SHALL truncate
from the beginning (since the end tends to be more unique
than the beginning).

jobAccountName(21), OCTET

STRINGmJobStringTC(SIZE(0..63))

OCTETS: Arbitrary binary information which MAY be coded
character set data or encrypted data supplied by the
submitting user for use by accounting services to
allocate or categorize charges for services provided,
such as a customer account name or number.

NOTE: This attribute NEED NOT be printable
characters.

Here is the updated JMP job state reasons:

JmJobStateReasons1TC ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

"The **JmJobStateReasonsNTC** ($N=1..4$) textual-conventions are used with the **jmJobStateReasons1** object and **jobStateReasonsN** ($N=2..4$), respectively, to provide additional information regarding the current **jmJobState** object value. These values MAY be used with any job state or states for which the reason makes sense.

NOTE - While values cannot be added to the **jmJobState** object without impacting deployed clients that take actions upon receiving **jmJobState** values, it is the intent that additional **JmJobStateReasonsNTC** enums can be defined and registered without impacting such deployed clients. In other words, the **jmJobStateReasons1** object and **jobStateReasonsN** attributes are intended to be extensible.

NOTE - The Job Monitoring MIB contains a superset of the IPP values[ipp-model] for the IPP 'job-state-reasons' attribute, since the Job Monitoring MIB is intended to cover other job submission protocols as well. Also some of the names of the reasons have been changed from 'printer' to 'device', since the Job Monitoring MIB is intended to cover additional types of devices, including input devices, such as scanners.

The following standard values are defined (in hexadecimal) as *powers of two*, since multiple values MAY be used at the same time. For ease of understanding, the **JmJobStateReasons1TC** reasons are presented in the order in which the reasons are likely to occur (if implemented), starting with the '**jobIncoming**' value and ending with the '**jobCompletedWithErrors**' value.

other **0x1**
The job state reason is not one of the standardized or registered reasons.

unknown **0x2**
The job state reason is not known to the agent or is indeterminate.

jobIncoming **0x4**
The job has been accepted by the server or device, but the server or device is expecting (1) additional

operations from the client to finish creating the job and/or (2) is accessing/accepting document data.

submissionInterrupted **0x8**

The job was not completely submitted for some unforeseen reason, such as: (1) the server has crashed before the job was closed by the client, (2) the server or the document transfer method has crashed in some non-recoverable way before the document data was entirely transferred to the server, (3) the client crashed or failed to close the job before the time-out period.

jobOutgoing **0x~~108~~**

Configuration 2 only: The server is transmitting the job to the device.

jobHoldSpecified **0x~~2010~~**

The value of the job's Error! Reference source not found. attribute is TRUE. The job SHALL NOT be a candidate for processing until this reason is removed and there are no other reasons to hold the job.

jobHoldUntilSpecified **0x~~4020~~**

The value of the job's Error! Reference source not found. attribute specifies a time period that is still in the future. The job SHALL NOT be a candidate for processing until this reason is removed and there are no other reasons to hold the job.

jobProcessAfterSpecified **0x~~8040~~**

The value of the job's Error! Reference source not found. attribute specifies a time that is still in the future. The job SHALL NOT be a candidate for processing until this reason is removed and there are no other reasons to hold the job.

resourcesAreNotReady **0x~~10080~~**

At least one of the resources needed by the job, such as media, fonts, resource objects, etc., is not ready on any of the physical devices for which the job is a candidate. This condition MAY be detected when the job is accepted, or subsequently while the job is **pending** or **processing**, depending on implementation.

deviceStoppedPartly **0x~~200100~~**

One or more, but not all, of the devices to which the job is assigned are stopped. If all of the devices are stopped (or the only device is stopped), the **deviceStopped** reason SHALL be used.

deviceStopped **0x~~400200~~**

The device(s) to which the job is assigned is (are all) stopped.

jobInterpreting 0x800
The device to which the job is assigned is interpreting the document data.

jobPrinting 0x~~1000400~~
The output device to which the job is assigned is marking media. This attribute is useful for servers and output devices which spend a great deal of time processing (1) when no marking is happening and then want to show that marking is now happening or (2) when the job is in the process of being canceled or aborted while the job remains in the processing state, but the marking has not yet stopped so that impression or sheet counts are still increasing for the job.

jobCanceledByUser 0x~~2000800~~
The job was canceled by the owner of the jobuser, i.e., by ~~an unknown user or by~~ a user whose name is the same as the value of the job's **jmJobOwner** object, or by some other authorized end-user, such as a member of the job owner's security group.

jobCanceledByOperator 0x~~41000~~
The job was canceled by the operator, i.e., by a user who has been authenticated as having operator privileges (whether local or remote) whose name is different than the value of the job's jmJobOwner object.

jobCanceledAtDevice 0x8000
The job was canceled by an unidentified local user, i.e., a user at a console at the device.

abortedBySystem 0x~~100002000~~
The job (1) is in the process of being aborted, (2) has beenwas aborted by the system and placed in the **'aborted'** state, or (3) has been aborted by the system and placed -

~~NOTE — When the system puts a job into the **'aborted'** job state, this reason is not needed. This reason is needed only when the system aborts a job, but, instead of placing the job in the **aborted** job state, places the job in the **'pendingHeld'** state, so that a user or operator can manually try the job again.~~

processingToStopPoint 0x~~200004000~~
The requester has issued an operation to cancel or interrupt the job or the server/device has aborted the job, but the server/device is still performing some actions on the job until a specified stop point occurs or job termination/cleanup is completed.

This reason is recommended to be used in conjunction with the processinganceled ~~or~~ **aborted** job state to indicate that the

server/device is still performing some actions on the job ~~while~~after the job ~~remains in~~leaves the **processing** state. After all the , so that some of the job's resources consumed counters may have stopped still be incrementing, the server/device moves the job from the **processing** state to ~~while the job is in~~ the **canceled** or **aborted** job states.

serviceOffline **0x40000**
The service or document transform is off-line and accepting no jobs. All **pending** jobs are put into the **pendingHeld** state. This situation could be true if the service's or document transform's input is impaired or broken.

jobCompletedSuccessfully **0x80000**
The job completed successfully.

jobCompletedWithWarnings **0x100000**
The job completed with warnings.

jobCompletedWithErrors **0x200000**
The job completed with errors (and possibly warnings too).

The following additional job state reasons have been added to represent job states that are in ISO DPA[iso-dpa] and other job submission protocols:

jobPaused **0x400000**
The job has been indefinitely suspended by a client issuing an operation to suspend the job so that other jobs may proceed using the same devices. The client MAY issue an operation to resume the paused job at any time, in which case the agent SHALL remove the **jobPaused** values from the job's **jmJobStateReasons1** object and the job is eventually resumed at or near the point where the job was paused.

jobInterrupted **0x800000**
The job has been interrupted while processing by a client issuing an operation that specifies another job to be run instead of the current job. The server or device will automatically resume the interrupted job when the interrupting job completes.

jobRetained **0x1000000**
The job is being retained by the server or device with all of the job's document data (and submitted resources, such as fonts, logos, and forms, if any). Thus a client could issue an operation to the server or device to either (1) re-do the job (or a copy of the job) on the

same server or device or (2) resubmit the job to another server or device. When a client could no longer re-do/resubmit the job, such as after the document data has been discarded, the agent SHALL remove the **jobRetained** value from the **jmJobStateReasons1** object."

REFERENCE

"These bit definitions are the equivalent of a type 2 enum except that combinations of bits may be used together. See section **Error! Reference source not found.** The remaining bits are reserved for future standardization and/or registration."

SYNTAX **INTEGER(0..2147483647)** -- 31 bits, all but sign bit

JmJobStateReasons2TC ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

"This textual-convention is used with the **jobStateReasons2** attribute to provides additional information regarding the **jmJobState** object. See the description under **JmJobStateReasons1TC** for additional information that applies to all reasons.

The following standard values are defined (in hexadecimal) as *powers of two*, since multiple values may be used at the same time:

- | | |
|--|------------|
| cascaded | 0x1 |
| An outbound gateway has transmitted all of the job's job and document attributes and data to another spooling system. | |
| deletedByAdministrator | 0x2 |
| The administrator has deleted the job. | |
| discardTimeArrived | 0x4 |
| The job has been deleted due to the fact that the time specified by the job's job-discard-time attribute has arrived. | |
| postProcessingFailed | 0x8 |
| The post-processing agent failed while trying to log accounting attributes for the job; therefore the job has been placed into the completed state with the jobRetained jmJobStateReasons1 object value for a system-defined period of time, so the administrator can examine it, resubmit it, etc. | |

jobTransforming **0x10**
The server/device is interpreting document data and producing another electronic representation.

~~**submissionInterrupted** **0x10**
Indicates that the job was not completely submitted for some unforeseen reason, such as: (1) the server has crashed before the job was closed by the client, (2) the server or the document transfer method has crashed in some non-recoverable way before the document data was entirely transferred to the server, (3) the client crashed or failed to close the job before the time-out period.~~

maxJobFaultCountExceeded **0x20**
The job has faulted several times and has exceeded the administratively defined fault count limit.

devicesNeedAttentionTimeOut **0x40**
One or more document transforms that the job is using needs human intervention in order for the job to make progress, but the human intervention did not occur within the site-settable time-out value.

needsKeyOperatorTimeOut **0x80**
One or more devices or document transforms that the job is using need a specially trained operator (who may need a key to unlock the device and gain access) in order for the job to make progress, but the key operator intervention did not occur within the site-settable time-out value.

jobStartWaitTimeOut **0x100**
The server/device has stopped the job at the beginning of processing to await human action, such as installing a special cartridge or special non-standard media, but the job was not resumed within the site-settable time-out value and the server/device has transitioned the job to the **pendingHeld** state.

jobEndWaitTimeOut **0x200**
The server/device has stopped the job at the end of processing to await human action, such as removing a special cartridge or restoring standard media, but the job was not resumed within the site-settable time-out value and the server/device has transitioned the job to the completed state.

jobPasswordWaitTimeOut **0x400**
The server/device has stopped the job at the beginning of processing to await input of the job's password, but the password was not received within the site-settable time-out value.

deviceTimedOut **0x800**
A device that the job was using has not responded in a period specified by the device's site-settable attribute.

connectingToDeviceTimeOut **0x1000**
The server is attempting to connect to one or more devices which may be dial-up, polled, or queued, and so may be busy with traffic from other systems, but server was unable to connect to the device within the site-settable time-out value.

transferring **0x2000**
The job is being transferred to a down stream server or downstream device.

queuedInDevice **0x4000**
The server/device has job has been queued the job in a down stream server or downstream device.

~~**jobQueued** **0x8000**
The server/device has queued the document data.~~

jobCleanup **0x108000**
The server/device is performing cleanup activity as part of ending normal processing.

jobPasswordWait **0x20000**
The server/device has selected the job to be next to process, but instead of assigning resources and starting the job processing, the server/device has transitioned the job to the **pendingHeld** state to await entry of a password (and dispatched another job, if there is one).

validating **0x40000**
The server/device is validating the job *after* accepting the job.

queueHeld **0x80000**
The operator has held the entire job set or queue.

jobProofWait **0x100000**
The job has produced a single proof copy and is in the **pendingHeld** state waiting for the requester to issue an operation to release the job to print normally, obeying any job and document copy attributes that were originally submitted.

heldForDiagnostics **0x200000**
The system is running intrusive diagnostics, so that all jobs are being held.

~~**serviceOffLine** **0x400000**
The service/document transform is off line and accepting no jobs. All pending jobs are put into the pendingHeld~~

~~state. This could be true if its input is impaired or broken.~~

- noSpaceOnServer** **0x800000**
There is no room on the server to store all of the job.
- pinRequired** **0x1000000**
The System Administrator settable device policy is (1) to require PINs, and (2) to hold jobs that do not have a pin supplied as an input parameter when the job was created.
- exceededAccountLimit** **0x2000000**
The account for which this job is drawn has exceeded its limit. This condition SHOULD be detected before the job is scheduled so that the user does not wait until his/her job is scheduled only to find that the account is overdrawn. This condition MAY also occur while the job is processing either as processing begins or part way through processing.
- heldForRetry** **0x4000000**
The job encountered some errors that the server/device could not recover from with its normal retry procedures, but the error might not be encountered if the job is processed again in the future. Example cases are phone number busy or remote file system in-accessible. For such a situation, the server/device SHALL transition the job from the **processing** to the **pendingHeld**, rather than to the **aborted** state.
- The following values are from the X/Open PSIS draft standard:
- canceledByShutdown** **0x8000000**
The job was canceled because the server or device was shutdown before completing the job.
- deviceUnavailable** **0x10000000**
This job was aborted by the system because the device is currently unable to accept jobs.
- wrongDevice** **0x20000000**
This job was aborted by the system because the device is unable to handle this particular job; the spooler SHOULD try another device or the user should submit the job to another device.
- badJob** **0x40000000**
This job was aborted by the system because this job has a major problem, such as an ill-formed PDL; the spooler SHOULD not even try another device. "

REFERENCE

"These bit definitions are the equivalent of a type 2 enum except that combinations of them may be used

together. See section **Error! Reference source not found.** See the description under **JmJobStateReasons1TC** and the **jobStateReasons2** attribute."

SYNTAX **INTEGER(0..2147483647)** -- 31 bits, all but sign bit

JmJobStateReasons3TC ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

"This textual-convention is used with the **jobStateReasons3** attribute to provides additional information regarding the **jmJobState** object. See the description under **JmJobStateReasons1TC** for additional information that applies to all reasons.

The following standard values are defined (in hexadecimal) as *powers of two*, since multiple values may be used at the same time:

jobInterruptedByDeviceFailure **0x1**

A device or the print system software that the job was using has failed while the job was processing. The server or device is keeping the job in the **pendingHeld** state until an operator can determine what to do with the job."

REFERENCE

"These bit definitions are the equivalent of a type 2 enum except that combinations of them may be used together. See section **Error! Reference source not found.** The remaining bits are reserved for future standardization and/or registration. See the description under **JmJobStateReasons1TC** and the **jobStateReasons3** attribute."

SYNTAX **INTEGER(0..2147483647)** -- 31 bits, all but sign bit

JmJobStateReasons4TC ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

"This textual-convention is used in the **jobStateReasons4** attribute to provides additional information regarding the **jmJobState** object. See

the description under **JmJobStateReasons1TC** for additional information that applies to all reasons.

The following standard values are defined (in hexadecimal) as *powers of two*, since multiple values may be used at the same time:

none yet defined. These bits are reserved for future standardization and/or registration."

REFERENCE

"These bit definitions are the equivalent of a type 2 enum except that combinations of them may be used together. See section **Error! Reference source not found.** See the description under **JmJobStateReasons1TC** and the **jobStateReasons4** attribute."

SYNTAX **INTEGER(0..2147483647)** -- 31 bits, all but sign bit

Now for the IPP "job-state" and "job-state-reasons":

4.3.8 job-state (type1 enum)

This attribute identifies the current state of the job. Even though the IPP protocol defines eight values for job states, implementations only need to support those states which are appropriate for the particular implementation. In other words, a Printer supports only those job states implemented by the output device and available to the Printer object implementation.

Standard values are:

'unknown'(2): The job state is not known, or its state is indeterminate.

'pending'(3): The job is a candidate to start processing, but is not yet processing.

'pending-held'(4): The job is not a candidate for processing for any number of reasons but will return to the 'pending' state as soon as the reasons are no longer present. The job's "job-state-reason" attribute SHALL indicate why the job is no longer a candidate for processing.

'processing'(5): ~~One of~~Either:

1. the job is using, or is attempting to use, one or more ~~document transforms which include (1)~~ purely software processes that are analyzing, creating, or interpreting a PDL, etc., and (2)
2. the job is using, or is attempting to use, one or more hardware devices that are interpreting a PDL, making marks on a medium, and/or performing finishing, such as stapling, etc.,

OR

32. (configuration 2) the server has made the job ready for printing, but the output device is not yet printing it, either because the job hasn't reached the output device or because the job is queued in the output device or some other spooler, awaiting the output device to print it.

Implementations MAY, though they NEED NOT, include additional values in the job's "job-state-reasons" attribute to indicate the progress of the job, such as adding the 'job-printing' value to indicate when the device is actually making marks on a medium.

~~ISSUE: Suggested change to (but this must be synchronized with JMP)~~

~~'processing'(5): One of:~~

1. ~~the job is using, or is attempting to use hardware devices that are making marks on a medium, and/or performing finishing, such as stapling OR~~
2. ~~the job is using, or is attempting to use software processes that are analyzing or interpreting a PDL without making marks on a medium.~~
3. ~~the server has made the job ready for printing, but the output device is not yet printing it, either because the job hasn't reached the output device or because~~

~~the job is queued in the output device or some other spooler, awaiting the output device to print it.~~

When the job is in the 'processing' state, the entire job state includes the detailed status represented in the printer's "printer-state", "printer-state-reasons", and "printer-state-message" attributes.

Implementations MAY include additional values in the job's "job-state-reasons" attribute to indicate the progress of the job, such as adding the 'job-printing' value to indicate when the output device is actually making marks on paper and/or the 'processing-to-stop-point' value to indicate that the server or device is in the process of canceling or aborting the job. Most implementations won't bother with this nuance.

'processing-stopped'(6): The job has stopped while processing for any number of reasons and will return to the 'processing' state as soon as the reasons are no longer present.

The job's "job-state-reason" attribute MAY indicate why the job has stopped processing. For example, if the output device is stopped, the 'printer-stopped' value MAY be included in the job's "job-state-reasons" attribute.

NOTE - When an output device is stopped, the device usually indicates its condition in human readable form locally at the device. A client can obtain more complete device status remotely by querying the printer's "printer-state", "printer-state-reasons" and "printer-state-message" attributes.

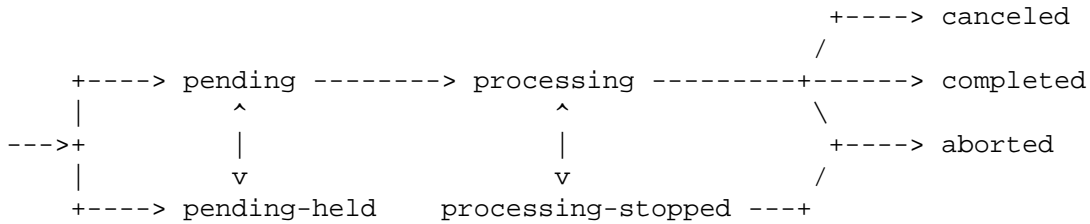
'canceled'(7): The job has been canceled by a Cancel-Job operation and ~~the Printer has is either (1) in the process of terminating or (2) has completed~~ canceling the job and all job status attributes have reached their final values for the job terminating. While the Printer is canceling the job, the job's "job-state-reasons" attribute SHOULD contain the 'processing-to-stop-point' value and one of either the 'canceled-by-user', 'canceled-by-operator', or 'canceled-at-device' value.

'aborted'(8): The job has been aborted by the system, usually while the job was in the 'processing' or 'processing-stopped' state and the Printer has completed aborting the job and all job status attributes have reached their final values for the job. While the server or device is aborting the job, the job's "job-state-reasons" attribute MAY contain the 'processing-to-stop-point' and 'aborted-by-system' values. If supported, the 'aborted-by-system' value SHALL remain while the job is in the 'aborted' state.

'completed'(9): The job has completed successfully or with warnings or errors after processing and all of the job media sheets have been successfully stacked in the appropriate output bin(s). The job's "job-state-reasons" attribute SHOULD contain one of: 'completed-successfully', 'completed-with-warnings', or 'completed-with-errors' values.

The final value for this attribute SHALL be one of: 'completed', 'canceled', or 'aborted' before the Printer removes the job altogether. The length of time that jobs remain in the 'canceled', 'aborted', and 'completed' states depends on implementation.

The following figure shows the normal job state transitions.



Normally a job progresses from left to right. Other state transitions are unlikely, but are not forbidden. Not shown are the transitions to the 'canceled' state from the 'pending', 'pending-held', '~~processing~~', and 'processing-stopped' states.

Jobs reach one of the three terminal states: 'completed', 'canceled', or 'aborted', after the jobs have completed all activity, including stacking output media, after the jobs have completed all activity, and all job status attributes have reached their final values for the job.

4.3.9 job-state-reasons (1setOf type2 keyword)

This attribute provides additional information about the job's current state, i.e., information that augments the value of the job's "job-state" attribute.

Implementation of these values is OPTIONAL, i.e., a Printer NEED NOT implement them, even if (1) the output device supports the functionality represented by the reason and (2) is available to the Printer object implementation. These values MAY be used with any job state or states for which the reason makes sense. Furthermore, when implemented, the Printer SHALL return these values when the reason applies and SHALL NOT return them when the reason no longer applies whether the value of the job's "job-state" attribute changed or not. When the job does not have any reasons for being in its current state, the Printer shall set the value of the job's "job-state-reasons" attribute to 'none'.

NOTE - While values cannot be added to the 'job-state' attribute without impacting deployed clients that take actions upon receiving "job-state" values, it is the intent that additional "job-state-reasons" values can be defined and registered without impacting such deployed clients. In other words, the "job-state-reasons" attribute is intended to be extensible.

The following standard values are defined. For ease of understanding, the values are presented in the order in which the reasons are likely to occur (if implemented), starting with the 'job-incoming' value:

'none': There are no reasons for the job's current state.

'job-incoming': The CreateJob operation has been accepted by the Printer, but the Printer is expecting additional Send-Document and/or Send-URI operations and/or is accessing/accepting document data.

'submission-interrupted': The job was not completely submitted for some unforeseen reason, such as: (1) the Printer has crashed before the job was closed by the client, (2) the Printer or the

document transfer method has crashed in some non-recoverable way before the document data was entirely transferred to the Printer, (3) the client crashed or failed to close the job before the time-out period.

'job-outgoing': The Printer is transmitting the job to the output device.

'job-hold-until-specified-~~time~~': The value of the job's "job-hold-until" attribute was specified withs a time period that is still in the future. The job SHALL NOT be a candidate for processing until this reason is removed and there are no other reasons to hold the job.

~~'job-hold-until-resources-are-not-ready'~~: At least one of the resources needed by the job, such as media, fonts, resource objects, etc., is not ready on any of the physical printer's for which the job is a candidate. This condition MAY be detected when the job is accepted, or subsequently while the job is pending or processing, depending on implementation.

'printer-stopped-partly': The value of the Printer's "printer-state-reasons" attribute contains the value 'stopped-partly'.

'printer-stopped': The value of the Printer's "printer-state" attribute is 'stopped'.

'job-interpreting': Job is in the 'processing' state, but more specifically, the Printer is interpreting the document data.

'job-queued': Job is in the 'processing' state, but more specifically, the Printer has queued the document data.

'job-transforming': Job is in the 'processing' state, but more specifically, the Printer is interpreting document data and producing another electronic representation.

'job-printing': The output device is marking media. This value is useful for Printers which spend a great deal of time processing (1) when no marking is happening and then want to show that marking is now happening or (2) when the job is in the process of being canceled or aborted while the job remains in the 'processing' state, but the marking has not yet stopped so that impression or sheet counts are still increasing for the job.

'job-cancelled-by-user': The job was cancelled by the owner of the jobuser using the Cancel-Job request, i.e., by a user whose name is the same as the value of the job's "job-originating-user" attribute, or by some other authorized end-user, such as a member of the job owner's security group.

'job-cancelled-by-operator': The job was cancelled by the operator using the Cancel-Job request, i.e., by a user who has been authenticated as having operator privileges (whether local or remote) whose name is different than the value of the job's "job-originating-user" attribute.

'job-canceled-at-device': The job was canceled by an unidentified local user, i.e., a user at a console at the device.

'aborted-by-system': The job (1) is in the process of being aborted, (2) has been aborted by the system and placed in the 'aborted' state, or (3) has been aborted by the system and placed in the 'pending-held' state, so that a user or operator can manually try the job again.

'processing-to-stop-point': The requester has issued a Cancel-job operation or the Printer object has aborted the job, but is still performing some actions on the job until a specified stop point occurs or job termination/cleanup is completed.

This reason is recommended to be used in conjunction with the 'processing' job state to indicate that the Printer object is still performing some actions on the job while the job remains in the 'processing' state. After all the job's job description attributes have stopped incrementing, the Printer object moves the job from the 'processing' state to the 'canceled' or 'aborted' job states.

'service-off-line': The Printer is off-line and accepting no jobs. All 'pending' jobs are put into the 'pending-held' state. This situation could be true if the service's or document transform's input is impaired or broken.

'job-completed-successfully': The job completed successfully.

'job-completed-with-warnings': The job completed with warnings.

'job-completed-with-errors': The job completed with errors (and possibly warnings too).

~~ISSUE: Show a partitioning of which "job state reasons" are valid or expected for each "job state" value.~~