TO: Distribution

FROM: Janice Phillipps

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SUBJECT: Proposed I/O facility for spooling off-line printer requests to tape.

At the present time, when the Multics off-line printer either breaks down or falls behind in its work load, nothing can be done to prevent long print request queues from building up. It is proposed here to set up a facility which will allow print requests to be spooled from the daemon print queues onto an ANSI tape which then can be processed and printed off-line on another system: for example, OS/370.

This spooling facility is to be set up as an Intermediate Interface Module (IIM), running in an I/O driver process, which will interface to the ANSI tape DIM. The spooling driver will attach the print request stream thru the IIM; in turn, the IIM will attach a tape drive thru the ANSI DIM. The IIM will assume responsibility for performing any necessary data transformation on the print request stream in preparing input to the ANSI DIM.

Intermediate Interface Module

The IIM will support the following IO system calls: attach, detach, write, order and changemode. The order calls get_count and reset, as well as the changemode calls of single, noskip, line_length, indent and page_length will be supported by the IIM to maintain output compatibility with the printer DIM. The input stream to the IIM will be parsed into variable length logical records with maximum size equal to that of the OS printer line width. A buffering scheme will accommodate the difference between the Multics printer line width (136 characters) and the OS printer line width (132 characters). In processing the input stream, NL characters will be stripped, RDWs (record descriptor words) will be composed and ANSI printer channel control characters will be inserted in each record following the RDW. The output record blocking scheme used by the IIM will be based on the maximum block size allowed by the Multics tape DCM.

For each ANSI volume-set written, a print request count and print request line count will be maintained. The request line count will be a tally of NL characters, and will not include lines of header-sheets or tail-sheets in the count.

ANSI DIM Output

The ANSI tape that will be written will be 1600-bpi nine-track ascii tapes written in either D-format or in S-format logical records and blocked in an optimal scheme. Each print request will appear on tape as an ANSI file, surrounded by ANSI standard labels.

Operator Interface

Operations will login the spooling driver just like any other driver. After the device name and optional device class have been entered, the driver will try to validate the device id and recognizing that it is the spooling driver which is to be brought up, will ask operations to enter the the volume id of the tape or tapes to be used for spooling. At this time two optional spooling limit arguments may be entered: some number of print requests to be spooled and some number of kilolines from the request queue to be spooled. If both spooling limit arguments are non-zero, the first one to be satisfied will be the actual limiting one. A typical command line to the spooling driver in the process of attaching might look like

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070064,070065 50 60
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This would be interpreted by the IIM as a request either to spool the next fifty queued print requests onto tape or to spool the next sixty thousand lines from the print queue onto tape, whichever comes first. Furthermore, the spooling will begin with reel 070064 and continue onto reel 070065, as needed. Operations may specify in advance, up to ten volume ids for a volume-set. If no spooling limit arguments are supplied, the spooling will go on unrestricted, with perodic requests for more volume ids as the IIM's list of volume ids becomes exhausted. When the spooling work is completed, the driver will ask operations either to specify more work destined for the current tape volume-set or to detach the IIM, which will detach the current tape volume. Further attach commands to the spooling driver will prompt the entering of new volume id and optional spooling limits.

The print requests will be processed thru the spooling driver just as thru the printer driver including access checking and accounting. Error messages will be written on the stream error_output; included here will be questions sent thru command_query_ (e.g. request for follow-on volume id when end-of-volume condition is raised).

OS Interface

The final part of the spooling facility implementation consists of a module on the OS side which will prepare the files from the ANSI tape for the OS printer. The tape will have to be unblocked and all block padding stripped; the ANSI files will have to be translated from ASCII to EBCDIC, all ASCII characters

which do not have EBCDIC character mappings, yet which do appear on the OS print chain will have to be given some EBCDIC character assignments; and the functions of backspace, vertical tabs, and page throw will have to be handled.