file

Honeywell

TEXT PROCESSING

MULTICS

SOFTWARE

Among its many utility capabilities, Multics provides a multitude of text editing and formatting options that give the user flexibility in creating and maintaining error-free text and in producing properly formatted output. The Multics text processing routines include two text editors and a text formatting routine.

TEXT EDITING

The standard Multics text editor, edm (editor for Multics), features 22 requests that can be learned quickly without having to spend time learning special computer languages. Other than familiarity with the edm requests and terminals, no special knowledge is needed.

Another editing routine, called qedx, offers a wider latitude of applications. Based on a powerful text editing language called QED, qedx offers a basic set of editing requests that, like edm, allows the user to create and edit ASCII files. In addition, the user wishing more than that basic ability can advance to another level of file manipulation and control. In fact, for the more advanced user, qedx becomes a relatively powerful pseudo-programming language.

Common Features

There are many outstanding features common to both edm and qedx. For example, a data or source-program segment requiring editing can be virtually any size. The user doesn't need to know its size, physical or logical location, or manipulation by the Multics System.

For another example, if Multics system commands were executed during edm or qedx editing, the buffers being edited would not be affected. This allows the user to do his text editing concurrently with other program and data processing operations.

Editing requests in edm and qedx are convenient. For simplicity, most requests are abbreviated to just one character (e.g., *p* for *print,* and *c* for *change).* Some requests, such as *change,* can be directed to affect any range of lines, from one to all (globally). A string of characters can be added to the beginning or end of a line of text without having to reference any existing character string in the line.

Both edm and qedx can be invoked in a variety of ways, thus increasing their flexibility and range of applications. They may be called from the terminal, from a command list stored in a segment, or from a program; in addition, qedx can be called recursively.

To make editing simpler, segments need to be referenced only once in most cases. This is also true of character strings when the same string is to be used in several different editing requests. Both edm and qedx "remember" which segment is being edited as well as what character string is involved in a search.

All of these common features add up to fast, efficient editing on a Multics System.

Features Specific to edm

- Verbose mode—prints helpful information for the new user. This mode can be inhibited by the user when he gains more experience and wishes to increase his editing speed.
- Line addressing—uses an imaginary pointer. Special edit requests manipulate this pointer forward or backward from its current position to the beginning or end of the segment, or to a content-indicated line.

Features Specific to qedx

- qedx provides three basic methods of addressing:
  - by line number (an absolute search for a given line number).
  - by content (an absolute search for a character string).
  - by number of lines or content *relative* to a given line.

  Most importantly, these addressing methods can be combined in a single qedx request. For example, the request *+10INTRODUCTIONp* would direct the computer search to begin 10 lines down from the current line of text, and to continue from that point to the first line containing the string INTRODUCTION. That line would be printed. Combining addressing methods provides the user speed and flexibility in editing his segments.
- In qedx, each edit request includes an address; there are no special requests needed to manipulate the pointer.
- qedx provides six error messages to inform the user of invalid addressing or of failure to find the specified character string.
- qedx provides temporary buffers that can be used to store parts of segments being edited, or to store editing macros built by the user. Editing control over a current text segment could be passed to one of these buffers which in turn would execute a series of editing requests on the text segment. The use of macros to automatically edit segments saves the user a great deal of time and is the best way to use the total power of qedx. A pseudo-program can be written once; then used over and over again in editing different material. A change in the user's standard editing practices would require only a one-time change to the particular editing macro involved; all his text would be changed automatically by using this new macro.
- For user convenience, some ASCII characters are given special significance in issuing qedx requests. When these characters are also part of a character string being searched for, the special significance usually afforded them can be masked, and the search performed without confusion.

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Specifications may change as design improvements are introduced.

TEXT FORMATTING

Multics ability to edit a file for correct content is only one feature. Editing it for proper formatting is another. The Multics utility routine for text formatting, called runoff, provides many options that give the user complete control over the way his text looks when it is visually displayed.

There are two steps in the formatting process. First, the text is edited with an editing routine such as edm or qedx to place the formatting control characters in the text. These control characters are selected from among the many offered by runoff.

Then, when the runoff command is issued, the control arguments imbedded in the text are executed. Also at this time, additional control arguments—of a more general nature—can be specified. These arguments might include the output device to be used, the method of handling page breaks, page numbering, "time-outs," or other general control considerations.

The general conditions of outputting are thus defined only once, in a list of control arguments given with the runoff command. This allows the same text to be handled in different ways with a minimum amount of user time involved in changing parameters.

Imbedded Control Options

Some of the specific options for imbedded controls include:

- Control arguments can be imbedded in the text as separate lines beginning with a period or a blank space. Tab characters are converted into an appropriate string of blanks or line skips.
- The maximum number of characters per input or output line is 361. This permits 120 underlined characters plus the new line character.
- Expressions can be used in any request that requires a number argument and can be either arithmetic or string. Arithmetic operators include multiply, divide, plus, minus, equal, greater than, less than, boolean AND-OR-NOT, and others. Parentheses can be used for grouping. Either octal or decimal numbers can be used along with string constants. String variables can also be defined and substituted.
- Special built-in symbols in runoff are provided for footnote and equation numbering.
- Standard default arguments are used when none are specified.
- Margins can be set so that lines are left- or right-adjusted.
- Instructions can be given to print numeric values instead of character string values, or vice versa.
- The next line of text can be designated to begin at the top of a new page.
- The next line of text can be designated to begin on a new line of output. (i.e., a paragraph break)
- A line of text can be centered on the page.
- Spacing between lines can be specified as single, double, or some multiple.
- Headers and footers can be specified for all pages, or for even or odd pages only. Various control commands to manage these headers and footers can also be used. The page number can be set to print in the header or footer with the page number variable and automatically incremented by runoff after each page is created. Up to 20 lines of header and footer information can be printed on each page.
- Controls can be specified for equation lines.
- A Multics system command line can be imbedded in the text to be executed by the Multics supervisor when the segment is run off. For example, the user may wish to enter new information (e.g., variables or additional commands) at execution time. After the command is executed, control is returned to runoff.
- Special controls are available for creating footnotes and placing them at the bottom of a particular page.
- Options are provided to specify whether a line should be completely right-justified by inserting blanks or by merely filling the line with as many complete words as possible.
- A different named segment can be inserted in the middle of a text segment being edited. Segments can be merged; parts of segments, rearranged.
- Indenting can be specified for the next line of text or for all lines following.
- Labels or references can be defined for future control words.
- Runoff can be instructed to print n lines literally and not look for control lines or interpret any special characters.
- Line length can be set for all following lines.
- The top and bottom margins can be changed to a specified number of lines or incremented +n or -n from the current margins as set.
- Margins can be set between header, text, and foot copy.
- A block of lines can be reserved for a diagram, illustration, or photo.
- The text can be printed exactly as it appears in the text segment (same indenting, formatting, etc.).
- An odd page can be forced, as when a new chapter is desired.
- A new page can be forced and the page number incremented by n.
- The page length can be set to n lines or incremented by +n or -n lines.
- Arabic numerals can be converted to Roman.

Command Options

These arguments can appear in the list following the runoff command:

- Naming the segment or segments to be processed and the device to which printing is directed, including specific features of the device such as the font being used.
- Flagging of designated key characters so that they will be printed as blanks, to be replaced later by special symbols. As the lines containing key characters are output, they are also written into a reminder segment, and their page and line numbers recorded for future reference.
- Setting the page number from which printing is to begin.
- Invoking a word hyphenation procedure.
- Setting an overall indentation control to center printed copy on the paper.
- Invoking or suppressing page breaks.
- Printing source line numbers in the left margin of the output.
- Presetting the initial page number and having subsequent pages renumbered.
- Setting an argument string for the internal parameter segment used by runoff.
- Specifying the number of preliminary passes that runoff will make over the

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text to establish the value of certain symbols defined at various points in the input segment. The value of these symbols will be used as arguments to the final pass when output is produced.

- Directing output to a user-named segment rather than a printing device.
- Stopping the printing at the end of each page, to wait for a carriage return signal from the user before beginning the next.
- Specifying the page after which the printing will terminate.
- Specifying that printing of output should stop and not continue until a carriage return key is pressed.

ADDITIONAL FEATURES OF THE MULTICS SYSTEM

The Multics System, which Honeywell feels is one of the most advanced computer systems in the world, offers its users many outstanding features including public-utility-like system reliability, virtual memory and hierarchical file storage, controlled sharing of information among many simultaneous users, data security enforced by both hardware and software, and the interactive terminal as its primary mode of access. Because of these features, especially the latter, the text processing user is among those who profit most from the Multics System.

The Multics Operating System and PL/I Compiler are coded systems supported by documentation, periodic program maintenance, and where feasible, improvements to the current versions, provided they are not modified by the user. Training and certain software enhancements are available from Honeywell at additional cost.

The Other Computer Company:

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