Identification

Overview of the Boatload
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Purpose

We call "Boatload" a set of hardware and software functions, the purpose of which is to get loaded the Multics General loader (MGL) and transfer to it.

It operates in two phases:

The system initialization and boatload (hardware)
The bootstrap loader (software).

In fact, these two distinct parts must be thought as a unique program, with a unique function that is to load any 645 program and to transfer to it. It is understood that the 645 program to be loaded has to satisfy the interface conditions as described in section BL.1.02.

The hardware part of the Boatload is located in the GIOC diodes and is loaded in core when the operator pushes the boatload button; this program, known as the "bootload program", reads from the Multics System Tape the beginning of the software part, known as the "bootstrap loader" and transfers to its entry point. (It is not possible to read the whole bootstrap loader because it would require more than 64 words in the diodes). The bootstrap loader starts reading the rest of itself in the Multics System Tape, then loads the Multics General Loader and transfers to its entry point.

The boatload program and the bootstrap loader contain configuration independent code; the former is stored in binary in the GIOC diodes, the latter is coded in assembly language and stored at the beginning of the MST.

System Initialization and Bootload

It is a hardware function. Two buttons are provided in the GIOC:

a) The initialize button, which, when depressed, places all the active and passive units of the system in an initial state

b) The boatload button, which, when depressed causes a 64 word program to be transferred from the GIOC diodes to selected locations in core. This program is called the "Bootload Program".
The bootloader program will read the first two physical records of the Multics System Tape (MST); the first physical record is a label, the second one contains a physical header followed by the beginning of the "Bootstrap Loader", followed by a physical trailer. Then it transfers control to the beginning of the Bootstrap Loader.

<table>
<thead>
<tr>
<th>LABEL</th>
<th>First Physical Record of MST</th>
</tr>
</thead>
<tbody>
<tr>
<td>PH</td>
<td>Bootstrap Loader</td>
</tr>
<tr>
<td>PT</td>
<td>Second Physical Record of MST</td>
</tr>
</tbody>
</table>

PH = Physical Header
PT = Physical Trailer

The Bootstrap Loader

The beginning of the Bootstrap Loader has been read from the Multics System Tape by the Bootload program. When it receives control it starts reading the rest of itself on the MST. Then it determines the processor base address, creates a descriptor segment and sets the appending mode. Up to this point the Bootstrap Loader is executing in absolute mode and must be written in such a way that it is independent of the location in which it is loaded. The following steps will then be executed in appending mode.

The Bootstrap Loader, then, sets its fault and interrupt vector and reads on the MST all the segments that make up the Multics General Loader (MGL). For each segment it creates a segment descriptor word, that is appended to the actual descriptor segment, and creates an entry in the Segment Name Table associated with the MGL. This Table will be referred to as SNT.MGL, and will be used by the MGL to establish a dynamic linkage between its different segments. Each entry of this Table contains the segment name and the corresponding segment number.

When all the segments are read the bootstrap loader transfers to the MGL entry point, which must be given in the MST, as described in BL.4.01.

Multics System Tape format

The Multics System Tape format is described in MSPM section BL.4.01.
List of abbreviations used in the bootloader sections

Po = Processor base address
Bo = Bootload base address
Go = GIOC base address
Lo = First location of the Bootstrap Loader

COW = Connect Operand Word
SCW = Status Control Word
CPW = Command Pointer Word
CCW = Channel Command Word
DCW = Data Control Word
LPW = List Pointer Word

MST = Multics System Tape.

MGL = Multics General Loader.

SNT.MGL = Segment Name Table of the Multics General Loader.