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## What Makes a Successful Emulation Project? The Case of MULTICS

Someone was pondering what makes a successful emulation project...

I have been involved for the last four years in the emulation of the Honeywell DPS8/M mainframe and the restoration of its bespoke operating system Multics.

Multics was very important software; it pioneered many OS concepts in common use today. It ran only on a particular mainframe computer, about a hundred of which were ever built and there is only one left, stored in a museum warehouse with little chance of ever running again.

Starting in 2007, efforts to create an emulation of the mainframe started, as an volunteer open source collaboration. Dozens of volunteers and eleven years later, the emulator was released: 105,000 lines of code.

A lot went into the success: love and sweat, help from the engineers that designed the hardware and wrote Multics, infrastructure support from SourceForge, GitHub, WikiDot and the like, and access to other open source projects like DECPUN and libuv.

But the single most important thing -- that which made it possible -- was the release of the Multics source code by Bull, under the following license:

### *Historical Background*

*This edition of the Multics software materials and documentation is provided and donated to Massachusetts Institute of Technology by Group Bull including Bull HN Information Systems Inc. as a contribution to computer science knowledge.*

*This donation is made also to give evidence of the common contributions of Massachusetts Institute of Technology, Bell Laboratories, General Electric, Honeywell Information Systems Inc., Honeywell Bull Inc., Groupe Bull and Bull HN Information Systems Inc. to the development of this operating system. Multics development was initiated by Massachusetts Institute of Technology Project MAC (1963-1970), renamed*

*the MIT Laboratory for Computer Science and Artificial Intelligence in the mid 1970s, under the leadership of Professor Fernando Jose Corbato. Users consider that Multics provided the best software architecture for managing computer hardware properly and for executing programs. Many subsequent operating systems incorporated Multics principles.*

*Multics was distributed in 1975 to 2000 by Group Bull in Europe , and in the U.S. by Bull HN Information Systems Inc., as successor in interest by change in name only to Honeywell Bull Inc. and Honeywell Information Systems Inc.*

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Without the release of the operating system source, debugging the emulator would not have been possible. The operating system provides a definitive reference for the behavior of the hardware; and with the source, it is possible to compare the observed behavior with the expected.

Many of the extant emulation projects have access to working examples of the hardware, allowing side-by-side comparison with the emulator and the ability to do very detailed testing of fine points. The DPS8/M project had no such access; they had only partial and often incorrect documentation; and was never intended as an emulation reference guide.

So one of the most important aspects of successful emulation projects is access to information: very, very detailed information on the targeted platform.

Opportunities for SPN to foster emulation development:

- Help with tracking down information: Metadata standards are a very good start; but generating participation of collection holders in publishing their contents is needed.
- Making it easier for IP holders to release information. I would suggest that SPN Legal could start with a Multics license and generate up a more generic “historical and research” licence and add it to the toolkit for use in offering IP holders ways to participate.
- Recruitment: fostering collaboration between emulation efforts, collection holders, IP holders. What tools and resources can SPN offer that would make participation beneficial?