

Building Open Source Software on DEC ULTRIX V4.5

RISC / VAX

Revision 2.2 - 01.09.02

Joachim Buss

e-mail: joachimbuss@gmx.net

ULTRIX is an old BSD style UNIX platform that is in many ways obsolete. It is, however, the only official proprietary OS available for DEC RISC architecture computers. It's also the fastest available OS for both VAX and RISC computers, since it has full support for all accelerated hardware. Building software on this platform can sometimes be very tricky. I'll here give you some advice to increase your chances with ULTRIX. – Joachim Buss

1 System Software

- Install the full ULTRIX distribution on your DECstation / VAX, first (I mean ALL subsets). Note that the ULTRIX 4.5 CD-ROM installation doesn't install any unsupported software subsets, these have to be added *after* installing the full "supported" distribution. You can do this by mounting your ULTRIX 4.5 CD-ROM and change to the directory `"/cdrom/<arch>/UNSUPPORTED"` and do a `"setld -l ./"`. You can also use `scamp` command to install those subsets.
- Apply the Y2K Patch Kit if you have it, and set the date properly before you start compiling. If you don't have the kit you'll have to set the date to one second *before* the year 2000 and wait two seconds and then set the date to one second before 2001, wait etc. until you reach the current year, after that you can set the actual time and date. ULTRIX doesn't support years after 2038, though.
- The `/bin/sh` (and `/bin/sh5`) that comes with ULTRIX is obsolete and incompatible. Use `/usr/bin/ksh` instead. I actually copied `/usr/bin/ksh` over `/bin/sh`. That works fine.

2 Compiling Console Applications / Daemons

- Always check dependencies before trying to compile. I use NetBSD's package pages to get an idea of the dependencies, since many programs have incomplete documentation.
- Most newer programs won't build with DEC MIPS `cc2.1` or `cc3.0`. DEC VAX `vcc` is even worse. DEC MIPS `cc3.0` is better than the other, but `gcc` is even better than `cc3.0`. In general, older programs will build with `cc3.0` (e.g. X11R5). Even some programs won't build with `gcc` while `cc3.0` works fine ... confused?
- Use a large swap partition for `gcc` with ULTRIX/RISC (maybe larger than 128 MB). I use 128 MB RAM + 256 MB swap on my best DECstation. Otherwise you might get the error message "virtual memory exhausted". The `gcc` for ULTRIX/VAX doesn't require very much RAM or swap, 8 MB RAM + 64 MB swap will do just fine.

- If the program you are trying to build complains about that there is no symbol `strdup` to link to, then add the library “libiberty” (found in for example GNU binutils package) i.e. add the switch `-liberty` when you link.
- If get problems with the function `usleep` you will need to edit the sources to use some other function, because `usleep` is missing in ULTRIX. Sometimes when `napms` has been good enough, I’ve used that.
- For `gcc-2.7.2` and `gcc-2.8.1`: softlink `gcc` to `c++`, the GNU C++ that comes with `gcc` versions before 2.9.x doesn't work in ULTRIX. Alternatively: install the `gcc-2.95.2` package.

3 Compiling the MIT X Window System distribution and X11 applications

- The MIT X distribution will build on any DECstation with a fully installed ULTRIX, since the source code was designed to compile with DEC C. So just go ahead and compile! X11R6.1 builds in less than 2 hours on my DECstation 5000/260 with 128 MB RAM.
- X11R6.1 is the newest version to build the DECstation X-server `xdec` (by default), so if you want a working X-server which is the newest available, this is the package you want!
- You might want to upgrade to X11R6.1 before you try to compile any newer programs for X (but be sure to clean up the older X11 development environment, before upgrading). Some older programs will compile in fresh ULTRIX installation environment also. I’ve had trouble with newer X11 programs, errors may appear during linking phase, I don’t know what to do about them, sorry.

4 Replacing ULTRIX program components with new(er) GNU replacements

Very important note! ULTRIX `ld` *need* to be used during ULTRIX kernel compilation!

- You can disable various old ULTRIX programs like `ld`, `cxx` and use the GNU replacements. At minimum you should use `binutils-2.10`, `gcc-2.95.2` and GNU

make-3.79. On VAX you'll have to settle with gcc-2.8.1 for now. Some say that DEC C produces better binaries, but I'm not fully convinced.

- If you don't have the Y2K Patch Kit you might want to replace some obsolete ULTRIX components which are not Y2K compatible, with GNU / OpenSource programs! These components are quite many (for example date, some fileutils, and many others...).

5 Additional modifications

- New things will probably be discovered as long as I am compiling packages, so keep checking ftp://ftp.skynet.ie/ultrix_freeware for a new version of this document.
- If you have any additional advice about building open source software on ULTRIX, drop me an e-mail!

6 Disclaimer - Use my advice at your own risk!

These things, mentioned in this document are meant to help you in your task, to build open source software. I give no guarantees whatsoever that anything written here is correct. Use my advice only when you have complete backup of your system! If you use any of my advice, it will be at your own risk!

7 Contribution

If you have managed to compile some nice software for ULTRIX/RISC or ULTRIX/VAX that you want to share with others and me, you can contact me. I would gladly see to it, that your contributing packages will be available for download!

If you've got a working cross-compiler environment available for Intel x86 or DEC Alpha that will build binaries for ULTRIX/RISC or ULTRIX/VAX I'm very interested in trying it out.

8 Contacts

Joachim Buss	<i>Author of this document</i>	joachimbuss@gmx.net
David Airlie	<i>Contact at Skynet</i>	airlied@csn.ul.ie
Mattias Nordlund	<i>Contact at Eagle Computing</i>	mathew@eagle.y.se
Dennis Grevenstein	<i>Computer enthusiast</i>	dennis@pcde.inka.de
Bert DeKnuydt	<i>Freeware "guru"</i>	
"Lord Isildur"	<i>DEC enthusiast</i>	isildur@vaxpower.org

9 Links

My ULTRIX (RISC and VAX) Freeware Archive hosted by *Skynet, The University of Limerick Computer Society*, Ireland

ftp://ftp.skynet.ie/ultrix_freeware

http://ftp.skynet.ie/pub/ultrix_freeware

mirrors at *Eagle Computing*, Sweden:

<ftp://ftp.eagle.y.se/pub/ultrix/freeware>

<ftp://ftp.xanthosmicrosystems.com/pub/ultrix/freeware>

<http://ftp.xanthosmicrosystems.com/pub/ultrix/freeware>

ULTRIX (RISC and VAX) Freeware Archive at *The Retro-Computing Society of Rhode Island Inc*, U.S.A.

<http://starfish.osfn.org/ultrix/index.html>

ULTRIX (RISC and VAX) Freeware Archive at *Gesellschaft zur Foerderung kommunikativer Medien*, Germany

<ftp://ftp.mayn.de/pub/dec/ultrix>