

SOFTWARE DEVELOPMENT
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TO: Distribution

SUBJECT: New Blue Format Whale Software for TSX

Attached is a tutorial describing the features and methods of using the new software. All of the old whale up and down loaders are being replaced by a more general purpose pair of modules, UPWHA and NUWHA. These programs are exactly compatible with VAX/UNIX based UPWHALE and NUWHALE and store data in the same format. This data can be transferred between systems using MCU, CATCH, and TOSS.

Programmer: Steve Field x6833

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Unix Compatible Whale Software for TSX

A Tutorial

by

Steve Field

Introduction

This document describes in a tutorial format the new whale software for TSX systems operating under tsx+3.02 and whale version '6.0 G' and similarities to their VAX counterparts. Of primary interest is that data is stored in ascii files in BLU format and can be transferred between TSX and UNIX using the programs MCU, CATCH, and TOSS.

Basically, the whale tools written by Chan Min in 'C' on the VAX have been 'ported' over to TSX. This C code is more reliable and allows use of some system features not available with Fortran. For example, the new tools can have parameters passed to them in command files. Also, the uploader can do more than just an 8k image.

Converting APH objects to BLU format

The program ABLU is used to convert from the aph object file format to the ascii chomp whale format. A chomp is like an ascii hex byte but represents 5 bits.

The general form of the ablu command is: ('.' is TSX prompt)

```
.ablu filename[.obj] <cr>
```

the .obj file extension is optional and ablu will NOT accept any other file type. The following example shows typical usage:

```
.ablu dragon
```

once the command is executed, ablu will respond with the name of the object file, the size of the file in decles, and will create a file of the same name with an extension of .BLU:

```
object is ... dragon.obj  
count was 15523 decles
```

```
.  
.dir dragon
```

```
dragon.obj      dragon.blu      dragon.* (other files
```

Special Note

In using the software described below, the COMMAND FILE form should be used to minimize the possibilities of errors like system crashes. The 'real' form is shown for your information only and should not be used if it can be helped.

Downloading a BLU file

The program NUWHA, which on vax is NUWHALE, replaces ORCA as the whale downloader. Because of Nuwha's versatility, it also replaces the downloaders IMAGE, LMAG, and DCOLOR for files that are in BLU format. There are 2 forms of the nuwha command:

```
.nuwha <cr>  
      ARGV: [-ug] [filename] <cr>
```

or
 .nuw [-ug] [filename] <cr>

Note: programs doing 2-way communication through the terminal can not be run using the form as shown in ablu. This would cause a crash because of the way TSX/RT-11 handles command line fetching. Nuw gets around the command line problem by passing parameters as arguments to nuwha as described below.

First, nuwha is entered and then parameters are entered at the 'ARGV:' prompt. (This prompt is part of the C system and not changeable.) Filename can be any file with any type of extension in BLU format. THE EXTENSION MUST BE SPECIFIED!, there is no default.

Next is NUW. Nuw is actually just a command file that executes nuwha:

```
.typ nuw.com
```

```
r nuwha  
^1 ^2 ^3
```

.

The flags '-u' and '-g' have special meanings, for example:

```
.nuw -u sy:drclr.cod
```

.

Will load DrColor code segment into the whale and return to TSX for more commands without any other side effects.

```
.nuw -g vectrn.blu
```

.

Will load vectron code and tell whale to start the program and return to TSX prompt. You should see the program title screen on the TV.

```
.nuw bj.blu
```

.

>

Will load bj.blu file and put user in whale mode as indicated by the whale prompt '>'.

```
.nuw
```

.

>

Won't load anything, but will put user in whale mode.

Downloading continued...

Because nuwha can be run from a command file as shown above this opens up several useful cases such as loading several object files and starting up (1) or always executing the file on load (2) etc:

1. .typ myload.com ; example, not in distribution.

```
nuw -u file1
nuw -u file2
nuw -u file3
nuw -g file4
```

.

2. .typ goload.com ; example, not in distribution.

```
ablu ^1 ; convert the object
nuw -g ^1.blu ; and load with start.
```

.

Uploading BLU format files

The program UPWHA, which on vax is UPWHALE, replaces SPOUT, MAGIC, and UCOLOR and creates BLU format files. There are 2 forms of the upwha command:

```
.upwha <cr>
      ARGV: outfile start_addr end_addr <cr>
```

or .upw outfile start_addr end_addr <cr>

ALL parameters MUST BE PRESENT! There are no optional parameters.

Outfile can have ANY extension, if you want .blu it must be specified. Start and End addresses are specified in hex ascii format, for example:

```
.upwha
      ARGV: dread.blu 5000 6fff
```

Either address can be in the range 0000 to ffff and end_addr can be the same as start_addr but not less than start. If end_addr is less, outfile will be created but will be empty, If end_addr is equal to start_addr, a file will be created with enough information to store 1 decl.

Upw is a command file like nuw above:

```
.typ upw.com
```

```
r upwha
^1 ^2 ^3
```

.

Uploading continued...

There is no way to skip around areas in memory, different chunks of decles will have to be uploaded into seperate files. An example of upw might be:

```
.upw devils.vgr 67e0 6fff
```

which saves a DrColor data file called devils.vgr. And speaking of Dr Color...

Dr Color tools

Just like on the vax, the DrColor tools for uploading and downloading are only command files that make use of calls to nuwha and upwaha. There is one difference, in that there are 2 files for downloading. One loads the code and a data file and the other only loads a data file. The form of the commands is:

```
.drcode [filename] <cr>  
.drload [filename] <cr>
```

In the expanded listings of the command files below you should note that the .vgr extension is provided and drcode makes a nested call to drload:

```
.typ drload.com  
nuw -g ^1.vgr  
  
.typ drcode.com  
nuw -u sy:drclr.cod  
drload ^1  
  
.
```

To upload a DrColor data file, the command is DRSAVE:

```
.drsave filename <cr>  
  
.typ drsave.com  
upw ^1.vgr 67e0 6fff  
  
.
```

The first time you want to invoke DrColor after having powered up your whale, or done other loads, use the drcode command, eg:

```
.drcode
```

or any existing file could be used:

```
.drcode gar9
```

the first example just loads DrColor with a 'clean' work area, and the second does the same but goes on to also load gar9.vgr

DrColor continued...

retrieved from the users default surface. Once the DrColor code is in place, you should use drload for subsequent loads to minimize the time required for loading. At this point drcode should be used only if it somehow becomes corrupted, say, by another load. To save what you have done at any given point, use drsave as in:

```
.drsave devils
```

which will create a file named devils.vgr as in the uploading section example.

Converting old MrDr Color files to VGR

As of this writing, the only method available to convert files in the old format, Cgr, Mgr, Pgr, and Bgr to the new VGR whale format is to download using DCOLOR and then upload using DRSAVE.

```
.dcolor  
  bridgl  
  
(reset whale)  
  
.drsave bridgl
```

Converting DrColor data to ASM

The program VGRL, which on vax is GRL, replaces the TSX based fortran program also called GRL. The name was changed to protect the innocent. The form of vgrl is stand-alone like ablu:

```
.vgrl filename[.vgr] <cr>
```

the .vgr is optional but expected to exist and vgrl will not accept any other file type. The following example is typical:

```
.vgrl garfld
```

and after a minute or so an APH source file with extension .ASM will be created:

```
.dir garfld  
  
garfld.vgr      garfld.asm      ...(others)
```

VGRL, and vax based GRL have been enhanced to incorporate the latest features of DrColor, written by John Tomlinson.

Notes on Command files

The command files NUW, UPW, DRCODE, DRLOAD, and DRSAVE will be on the system device, sy:.. To use them properly you must first copy them to your default surface. If you change them, then you should back them up in case your files are lost for some reason.

Summary

APH to BLU Conversion:

```
.ablu filename[.obj] <cr>
```

Downloading:

```
.nuwha <cr>  
    [-ug] [filename] <cr>
```

```
.nuw [-ug] [filename] <cr>
```

Uploading:

```
.upwaha <cr>  
    outfile start_addr end_addr <cr>
```

```
.upw outfile start_addr end_addr <cr>
```

Dr Color:

```
.drcode [filename] <cr>
```

```
.drload [filename] <cr>
```

```
.drsava outfile <cr>
```

VGR to ASM Conversion:

```
.vgrl filename[.vgr] <cr>
```

Copy Command Files to Default Disk

(Only needs to be done once.)

```
.@sy:nucom <cr>
```

Appendix 1

Following this sheet are copys of the associated unix MAN pages for whale software described above. In some cases, such as Dr Color tools, there are slight differences in operation.

There may also be a more in depth discussion of each tool than is presented in the above tutorial. If you find yourself on the vax these pages would be extremely useful.

Nuwhale

Upwhale

Drload

Drsave

Grl

NAME

nuwhale - The Bluewhale downloader.

SYNTAX

nuwhale [-u] [-[addr]g] [file]

DESCRIPTION

Nuwhale downloads a program into the Bluewhale with which you may interactively debug programs written in 1610 assembler. Note that there exists another downloader called 'whale'. Being a true subset of 'nuwhale', 'whale' will be superceded by 'nuwhale' sooner or later. However, the two downloaders will coexist for the time being just for the sake of smooth transition.

The nuwhale command will connect your terminal to the Bluewhale emulator, sending all of your input to the Bluewhale instead of to UNIX. In this mode, none of the UNIX commands will work. To get back to UNIX, you must reset your terminal (hit the SET-UP key and then press 0).

If you supply the <file> argument, the contents of the given file are downloaded to the Bluewhale before you are connected. It is assumed that <file> contains Bluewhale format records. If it does not or if the Bluewhale is in a funny state, the system will hang and you will have to reset the terminal and the Bluewhale to get going again.

Once you are connected to the Bluewhale, you can enter Bluewhale commands to debug your program.

Option flag '-u' forces the downloader to connect the terminal back to UNIX. This flag is mandatory if the downloader is invoked more than once in a row inside a shell script.

Option flag '-g' will attempt to start executing the downloaded program. The starting address(in hex) is optional and defaults to 0x1041, if omitted.

DO NOT SEE

whale(1)

NAME

upwhale - Bluewhale uploader

SYNOPSIS

upwhale <outfile> <start-addr> <end-addr>

DESCRIPTION

Upwhale uploads a section of memory, specified by <start-addr> and <end-addr>, from the ZAX into a UNIX file <outfile>. If <outfile> does not exist, it is created.

FILES

/usr/bin/upwhale Bluewhale uploader

SEE ALSO

nuwhale(1)

DIAGNOSTICS

"Too many checksum errors" indicates that more than 16 checksum errors occurred in a row. If this error persists, check the hardware.

NAME

drload - Dr.Color Downloader

SYNOPSIS

drload [-f] [<file>]

DESCRIPTION

drload downloads <file>, if specified, that is assumed to have been created by 'drsave', the uploader of Dr.color. The actual name of the input file is made by suffixing '.vgr' to <file>. Note that the input file contains only the data section of Dr. color. By default, the code section of Dr. color is NOT downloaded to save downloading time. Hence, in case the code section has not yet been downloaded, you have to use '-f' option flag to force drload to download the code section.

For the sake of compatability with the original Dr.color, users are not required to specify the full name of the input file, even though the file has an extension part of ".vgr". Note that this naming convention is also supported by 'drsave', the uploader.

FILES

/usr/bin/drload	The downloader
/usr/bin/drsave	The uploader
/usr/bin/grl	The code generator
/usr/lib/drcolor.code	The code section of Dr.color
/usr/lib/drcolor.data	The data section of Dr.color

SEE ALSO

drsave(1)
grl(1)

EXAMPLE

drload	Just clean up the data section.
drload -f	Clean up the data section and also download the code section.
drload maze	Download the file "maze.vgr".

NAME

drsave - Dr.Color uploader

SYNOPSIS

drsave <file>

DESCRIPTION

drsave uploads the pictures from the Bluewhale and creates <file>.vgr. This file is in bluewhale file format and may be downloaded, for further refinements.

For the sake of compatability with the original Dr.color, users are not required to specify the full name of the input file, even though the file has an extension part of ".vgr". Note that this naming convention is also supported by 'drload', the downloader.

FILES

/usr/bin/drload	The downloader
/usr/bin/drsave	The uploader
/usr/bin/grl	The code generator
/usr/lib/drcolor.code	The code section of Dr.color
/usr/lib/drcolor.data	The data section of Dr.color

SEE ALSO

drload(1)
grl(1)

EXAMPLE

drsave maze Upload the picture and save it in "maze.vgr"

NAME

grl - APh code generator for Mr/Dr Color.

SYNOPSIS

grl <file>

DESCRIPTION

grl generates an APh assembly source code from the file "<file>.vgr". The assembly source file will be named as "<file>.asm".

For the sake of compatability with the original Mr/Dr color, users are not required to specify the full name of the input file, even though the file has an extension part of ".vgr". Note that this naming convention is also supported by 'mrload', 'mrsave', 'drload' and 'drsave'.

FILES

/usr/bin/grl	The code generator
/usr/bin/mrload	The Mr color downloader
/usr/bin/mrsave	The Mr color uploader
/usr/lib/mrcolor.code	The code section of Mr.color
/usr/lib/mrcolor.data	The data section of Mr.color
/usr/bin/drload	The Dr color downloader
/usr/bin/drsave	The Dr color uploader
/usr/lib/drcolor.code	The code section of Dr.color
/usr/lib/drcolor.data	The data section of Dr.color

SEE ALSO

mrload(1)
mrsave(1)
drload(1)
drsave(1)

EXAMPLE

grl maze Take maze.vgr as input and create maze.asm