

September 14, 2005

The Symbolic Hierarchical Automated Reliability and Performance Estimator (SHARPE) program will be used to model and evaluate the dependability of systems in this class. This document outlines the local procedures for utilizing SHARPE. It is assumed that you are reasonably familiar with UNIX from the user's perspective.

## 1 Initial Setup

The executable program file *sharpe* is located on the solaris workstations. The local output formatting script file *shout* is located in a separate sub-directory of my account, in which you will have Read-Execute privilege. For easy access, add the following line to your own *.profile* file. (Note, the description here is for the *cs* shell).

```
alias shout='csh /net/faculty/krings/SHARPE/shout'
```

You need to restart *.profile* after you made these changes. This can be done by either logging out and back in, or executing *.profile* in your home directory.

## 2 Executing Sharpe

First use your favorite editor to create a *sharpe* input file, using the convention *filename.shi*<sup>1</sup>. You may then run *sharpe* with the input file as an argument. Output is to the standard output (your screen) so you must redirect output to a file in order to save it. Please use the convention *filename.sho* for your output file. For example:

```
sharpe filename.shi >filename.sho
```

Note that the *input* file is an *argument*, while the *output* file is a *redirection* ">".

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<sup>1</sup>Do not use "filename" verbatim! Select some *filename* to be descriptive of the problem or system being simulated.

### 3 Printing Results

I want to see both the input and output files for each assignment. To simplify and standardize the output formats we use the shell script *shout*. It is trivial to use if you employed the file naming conventions in the previous section. Simply type:

```
shout filename
```

The script *shout* will concatenate *filename.shi* with *filename.sho*, and add in a header containing your name, a date-time stamp, and *filename*. The output is written to *filename.shout*. All you have to do is print *filename.shout* and hand it in.

Note: *shout* creates and removes some temporary files in your directory, all using the extension *.zzz*. If *shout* crashes before completion then they will not have been removed.

### 4 Example

Enclosed is an example of a Fault-Tree analysis of the triplex bus-guardian discussed in class. This example covers the “passive” failure mode. You are looking at file *BUSPASTREE.shout*. It was generated by the *shout* script, from files *BUSPASTREE.shi* and *BUSPASTREE.sho*. For your information, all of the relevant example files are read-enabled in directory:

```
/net/faculty/krings/SHARPE.
```

### 5 Practice

For practice, we will use the “active” failure mode of the same bus-guardian. If you have severe problems or want to check your results, look at the *BUSACTTREE.shout* file in directory 

```
/net/faculty/krings/SHARPE.
```

This directory also has several other example files, some templates for use in your input files, and other data of interest. The README.1ST file contains more details which could save you some time and effort this semester.

-----  
Login name: krings (messages off) In real life: Axel Krings

Wed Sep 6 10:49:52 CDT 1995

SHARPE SIMULATION: FILENAME = BUSPASTREE  
-----

```
*
* SYSTEM: TRIPLEX BUS GUARDIAN -- PASSIVE FAILURE MODE
*
* MODELS: FAULT--TREE
*
* epsilon results 1.0*10(-11)
* epsilon basic 1.0*10(-13)
* format 2

*----- MODEL DEFINITIONS
ftree bus_gd_pas
*
  basic tran_gate exp(LAMPas)
  or FAIL_PAS tran_gate tran_gate tran_gate
*
end

*----- PARAMETER BINDING
bind
*
  LAMPas 1.0*10-5
*
end

echo ##### PASSIVE FAILURE
cdf (bus_gd_pas)
*
eval (bus_gd_pas) 1 10 3
eval (bus_gd_pas) 20 100 20
*
var Qat1000 value(1000; bus_gd_pas)
```

```
expr Qat1000
```

```
echo ##### END
```

```
end
```

-----  
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SHARPE SIMULATION: FILENAME = BUSPASTREE  
-----

\* ##### PASSIVE FAILURE

CDF for system bus\_gd\_pas:

$$1.0000e+00 t( 0) \exp( 0.0000e+00 t) \\ + -1.0000e+00 t( 0) \exp(-3.0000e-05 t)$$

mean: 3.3333e+04

variance: 1.1111e+09  
-----

system bus\_gd\_pas

t F(t)

1.0000 e+00	3.0000 e-05
4.0000 e+00	1.1999 e-04
7.0000 e+00	2.0998 e-04
1.0000 e+01	2.9996 e-04

-----

system bus\_gd\_pas

t F(t)

2.0000 e+01	5.9982 e-04
4.0000 e+01	1.1993 e-03
6.0000 e+01	1.7984 e-03
8.0000 e+01	2.3971 e-03
1.0000 e+02	2.9955 e-03

-----

Qat1000: 2.9554e-02

\* ##### END