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Tests

Test Case 1, Bash/Dash

```
cat pg98.txt 2> err1.txt | sort -d 2>err1.txt 1>out1.txt
```

Test Case 1, Simpsh

```
./simpsh --rdonly pg98.txt --creat --wronly err1.txt --creat --wronly \
out1.txt --pipe --command 0 4 1 cat --close 4 --command 3 2 1 sort -d \
--wait
```

Test Case 2, Bash/Dash

```
find /usr/local/cs/bin 2>err2.txt | tr "/" "\n" 2>err2.txt | \
sort -u 2>err.txt | head -n 10000 1>out2.txt 2>err2.txt
```

Test Case 2, Simpsh

```
./simpsh --creat --wronly out2.txt --creat --wronly err2.txt --pipe \
--pipe --pipe --command 0 3 1 find /usr/local/cs/bin --command 2 5 1 \
tr "/" "\n" --command 4 7 1 sort -u --command 6 0 1 head -n 10000 \
--close 3 --close 5 --close 7 --wait
```

Test Case 3, Bash/Dash

```
ls -al 2>> err3.txt | sort 2>> err3.txt | tr '[:lower:]' '[:upper:]' 2>>
err3.txt >out3.txt && echo "Directory size: " 2>>err3.txt >>out3.txt && du
-sh . >>out3.txt 2>>err3.txt
```

Test Case 3, Simpsh

```
./simpsh --creat --trunc --append --wronly out3.txt --creat --append \
--wronly err3.txt --pipe --pipe --command 0 3 1 ls -al \
--command 2 5 1 sort --command 4 0 1 tr '[:lower:]' '[:upper:]' \
--close 3 --close 5 --wait --command 0 0 1 echo "Directory size: " \
--wait --command 0 0 1 du -sh --wait
```

Test Results

The test results here are the outcome of running each script 100 times. Therefore, the average runtime is given by the values below divided by 100. Because some of these values get quite small, the decision was made to keep the values as 100 times the individual runtime to assist the reader.

Test #	Bash	Dash	Simpsh
1	User: 9.313s System: 0.432s	User: 9.400000s System: 0.410000s	User: 9.386s System: 0.488s
2	User: 0.515s System: 0.571s	User: 0.490000s System: 0.460000s	User: 0.552s System: 0.439s
3	User: 0.236s System: 0.636s	User: 0.200000s System: 0.500000s	User: 0.313s System: 0.616s

Conclusions

Based on the set of tests that was run, there is little considerable difference between the performance of the three shells, at least in the given tasks. Dash was generally the fastest shell, having the best user times for all but test 1 (lost to Bash), and the best system times for all but test 2 (lost to Simpsh). Simpsh was the slowest shell for user time in all instances, but held its own against the other options for system time