The working directory for this tutorial is:

```
~/WorkingDir/Arch/
```

First download pin tools from here. Extract it by following command:

```
$tar xvfz pin-3.7-97619-g0d0c92f4f-gcc-linux.tar.gz
```

We should use 'pinatrace.so' tool for extracting the memory traces. At first, the tool should be compiled from 'pinatrace.cpp'. For doing that, we should change the working directory to '~/WorkingDir/Arch/pin-3.7/source/tools/ManualExamples' and run the following command

```
$ make -j8
```

where 8 is the number of processor cores. If compilation finishes successfully, you will have file 'pinatrace.so' inside the 'obj-intel64' or 'obj-intel32' (based on your OS and processor version) directory in your current folder. Now let's extract the memory trace for `ls` command:

```
$~/WorkingDir/Arch/pin-3.7/pin -t ~/WorkingDir/Arch/pin-
3.7/source/tools/ManualExamples/obj-intel64/pinatrace.so -- ls
```

At the end, the tools will create a file named `pinatrace.out` containing the memory trace for `ls` command. Here is an example of output:

```
0x7f1b5c113093: W 0x7ffec3424278
0x7f1b5c113ea0: W 0x7ffec3424270
0x7f1b5c113ea4: W 0x7ffec3424268
0x7f1b5c113ea6: W 0x7ffec3424260
0x7f1b5c113ea8: W 0x7ffec3424258
0x7f1b5c113eaa: W 0x7ffec3424250
0x7f1b5c113eaf: W 0x7ffec3424248
0x7f1b5c113ebf: R 0x7f1b5c339e68
0x7f1b5c113ec6: W 0x7f1b5c339720
0x7f1b5c113ed7: R 0x7f1b5c33a000
```