AMPSE Tutorial (dataset generation, based on Ring oscillator example)

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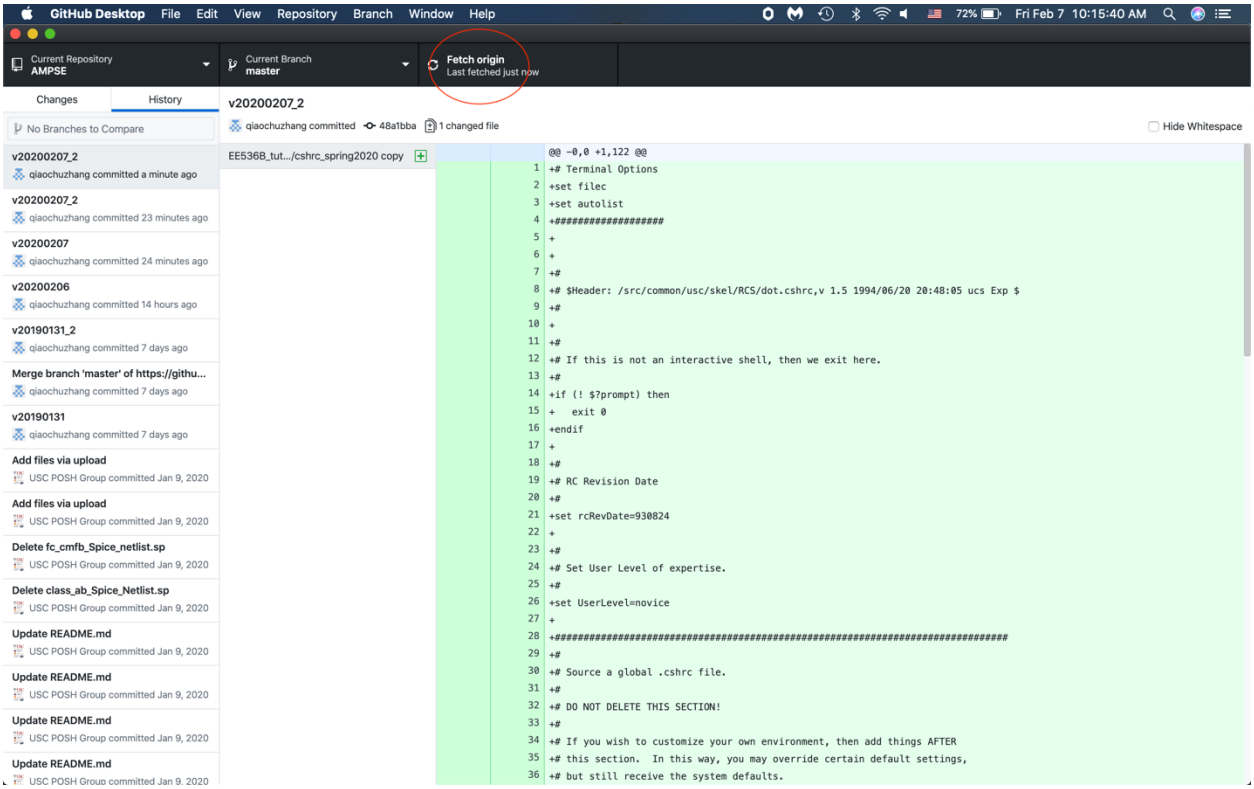
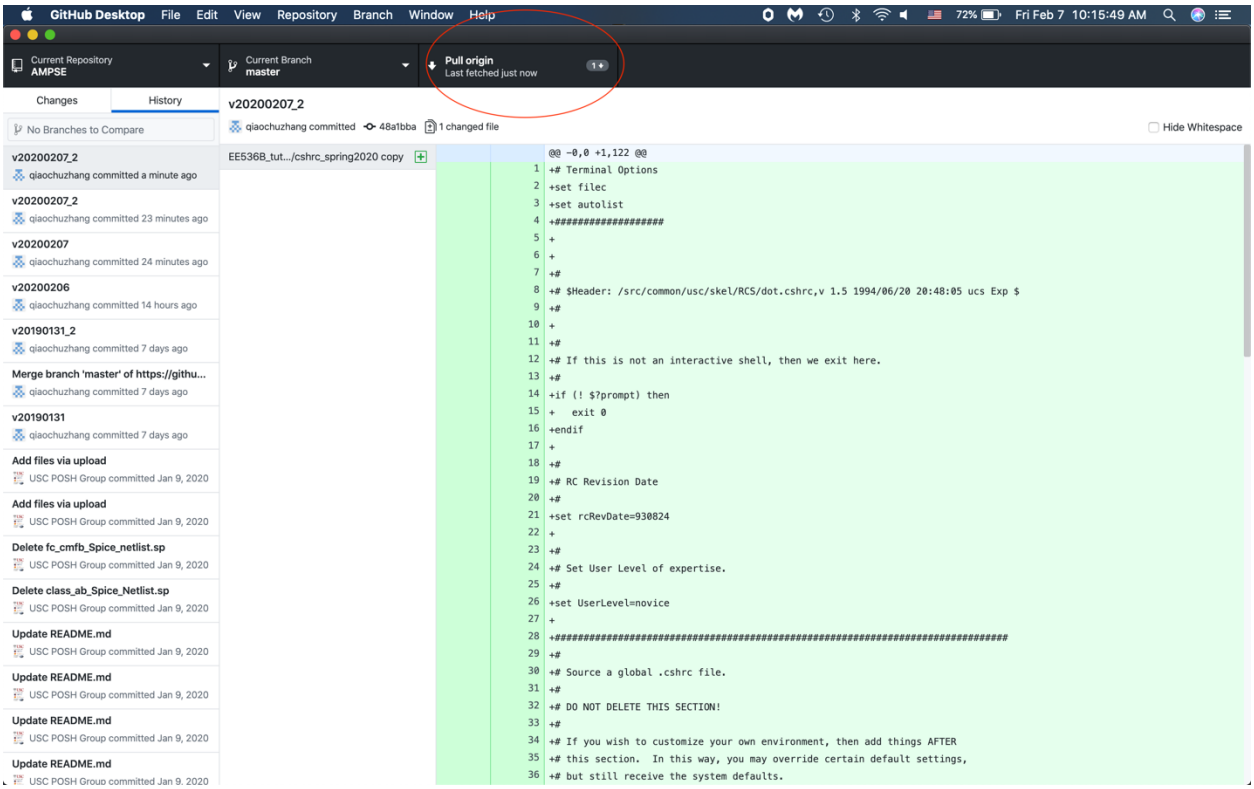
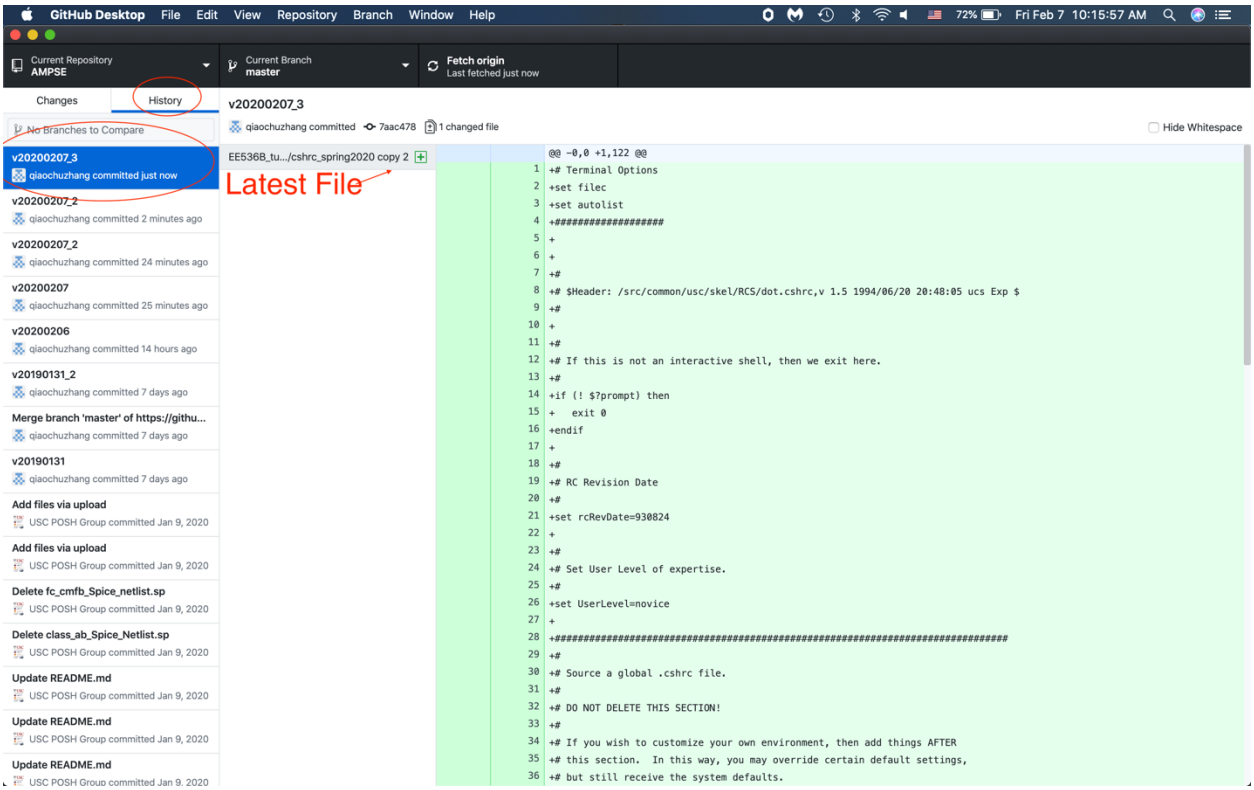
1. Download the workarea from GitHub and copy to your server/laptop.
   - Download GitHub desktop from https://desktop.github.com/, and install it
   - Clone the repo AMPSE from GitHub using GitHub desktop via https://github.com/USCPOSH/AMPSE.git
   - You can update the repo using GitHub desktop whenever there is any change on the cloud







- Upload /workarea_POSH to your Viterbi server home folder

2. Draw your circuit schematic in Cadence Virtuoso, and decide your design parameters by entering it in schematics
3. Export your parameterized netlist.
   - Open ADE L
   - Click simulation → Netlist →Display
   - Save your netlist to the folder. /workarea_POSH/RO_ee536b/netlists_sanitized
4. Open your netlist, write down measurement expressions at the end of netlist, and save it
   - The structure of . measure command is:
     - .MEAS (simulation type) (output name) (measurement expression)

Example:

```
//delay measurement
simulator lang=spice
.MEAS TRAN delay TRIG V(_net1) VAL=0.5 RISE=1 TARG V(_net0) VAL=0.5 FALL=1
```

More examples of .measure command

```
//gain
.MEAS AC gain MAX vdb(outd)

//pole1
.MEAS AC pole1 WHEN vp(outd) = -45

//pole2
.MEAS AC pole2 WHEN vp(outd) = -135

//Rout
.MEAS AC ROUT MAX vm(outr)

//GM
.MEAS AC gmax MAX vm(outd)
.MEAS AC GM PARAM = PAR('gmax/rout')

//power
.MEAS DC pwr AVG i(v0)

/common mode
.MEAS DC cmo AVG V(voutn)

//SWINGP
.MEAS DC vovp PARAM = 'lv10(X5.M8)'
.MEAS DC vdsp PARAM = 'lx3(X5.M8)'
.MEAS DC swingp PARAM = PAR('-vdsp-vovp')

//SWINGN
.MEAS DC vovn PARAM = 'lv10(X5.M0)'
```

```
.MEAS DC vdsn PARAM = 'lx3(X5.M0)'
.MEAS DC swingn PARAM = PAR('vdsn-vovn')

//SWING
.MEAS DC vov7 PARAM = 'lv10(X5.M7)'
.MEAS DC vds7 PARAM = 'lx3(X5.M7)'
.MEAS DC swing7 PARAM = PAR('-vds7-vov7')

//Cin
.MEAS AC Cin3db WHEN vdb(cap_cal) =-3
.MEAS AC Cin PARAM = PAR('1/2/3.1415/1000/Cin3db')

//Cout
.MEAS AC cout3db WHEN vp(outr) = 135
.MEAS AC COUT PARAM = PAR('1/2/3.1415/ROUT/cout3db')

//noise
.MEAS NOISE invn RMS INOISE //multiply by sqrt of pole1 in python to get the actual irn
//.MEAS NOISE irn PARAM = PAR('pole1*invn')
```

For more examples, you can check the hspice manual that I uploaded.

5. Open the script netlist_database.py, change the script by following the instruction in the comments
6. Open your terminal at ./workarea/RO_ee536b, run netlist_database.py by typing:

python netlist_database.py

7. Gather your dataset in the folder /datasets and enjoy your life!