

# Inverter

Doing analysis at TEMP = 25.000000 and TNOM = 27.000000

Warning: vin: no DC value, transient time 0 value used

Initial Transient Solution

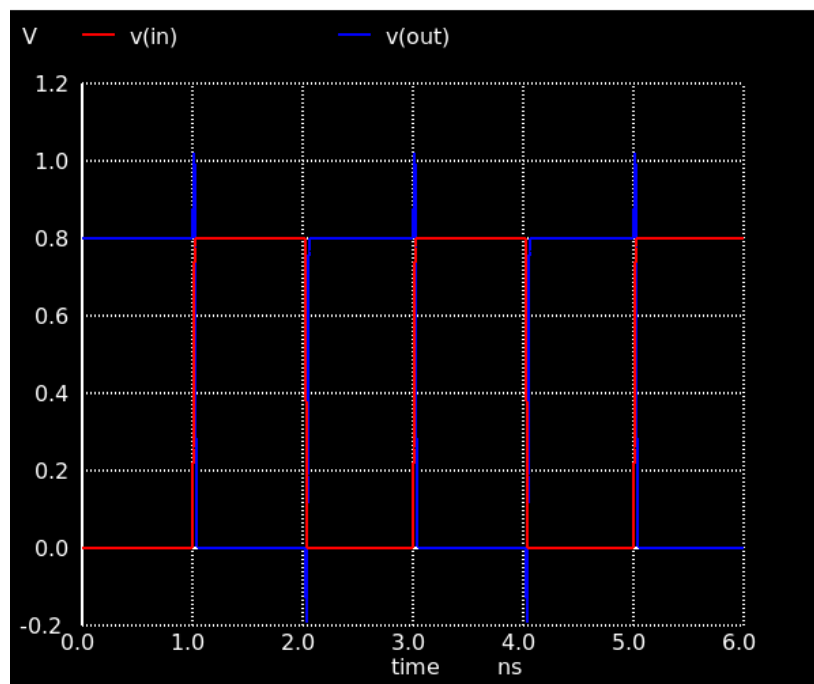
Node	Voltage
vdd	0.8
in	0
out	0.8
vin#branch	8.53243e-12
vdd#branch	-2.34897e-11

Reference value : 5.67650e-09

No. of Data Rows : 6038

Doing analysis at TEMP = 25.000000 and TNOM = 27.000000

tplh = 1.675702e-11 targ= 2.046757e-09 trig= 2.030000e-09  
tphl = 1.846314e-11 targ= 1.028463e-09 trig= 1.010000e-09  
tplh\_ps = 1.675702e+01  
tphl\_ps = 1.846314e+01



Circuit:

Doing analysis at TEMP = -40.000000 and TNOM = 27.000000

Warning: vin: no DC value, transient time 0 value used

Initial Transient Solution

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Node	Voltage
----	-----
vdd	0.8
in	0
out	0.8
vin#branch	8.04842e-12
vdd#branch	-9.42088e-12

Reference value : 4.83050e-09

No. of Data Rows : 6038

Doing analysis at TEMP = -40.000000 and TNOM = 27.000000

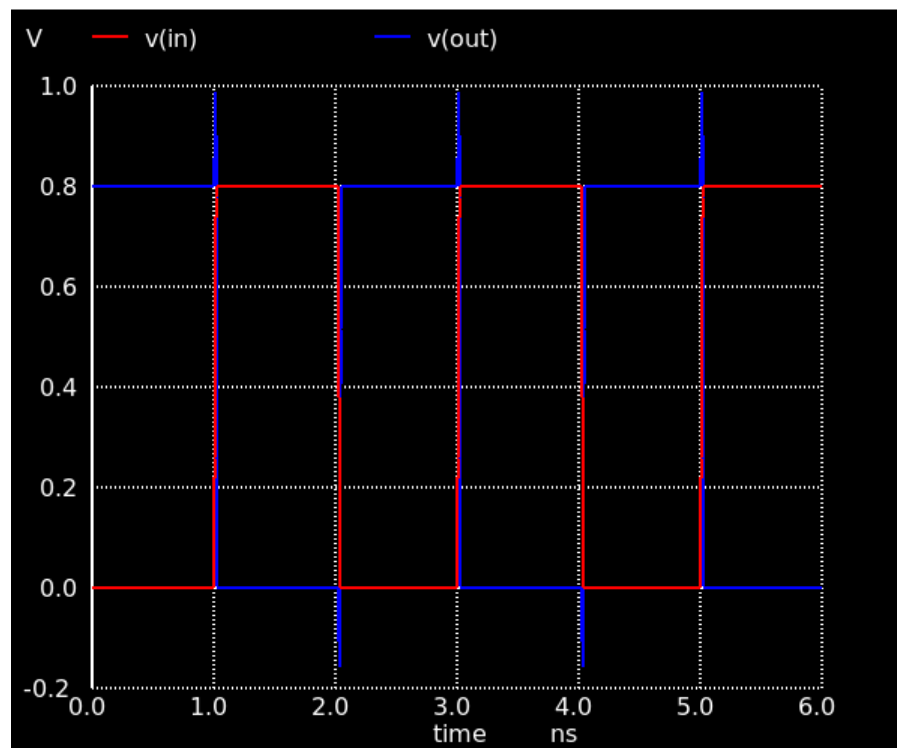
Warning: vin: no DC value, transient time 0 value used

tplh = 1.242956e-11 targ= 2.042430e-09 trig= 2.030000e-09

tphl = 1.365751e-11 targ= 1.023658e-09 trig= 1.010000e-09

tplh\_ps = 1.242956e+01

tphl\_ps = 1.365751e+01



Doing analysis at TEMP = 110.000000 and TNOM = 27.000000

Warning: vin: no DC value, transient time 0 value used

Initial Transient Solution

Node	Voltage
vdd	0.8
in	0
out	0.8
vin#branch	9.10625e-12
vdd#branch	-2.54575e-10

Reference value : 4.91250e-09

No. of Data Rows : 6038

Doing analysis at TEMP = 110.000000 and TNOM = 27.000000

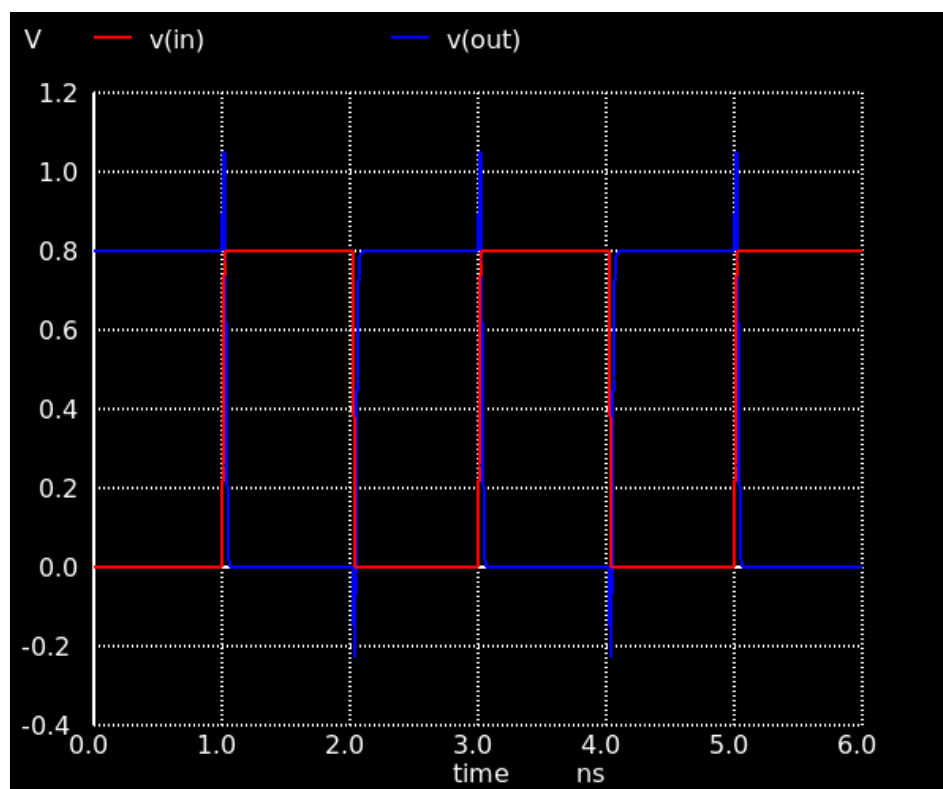
Warning: vin: no DC value, transient time 0 value used

tplh = 2.407749e-11 targ= 2.054077e-09 trig= 2.030000e-09

tphl = 2.657441e-11 targ= 1.036574e-09 trig= 1.010000e-09

tplh\_ps = 2.407749e+01

tphl\_ps = 2.657441e+01



## NAND2

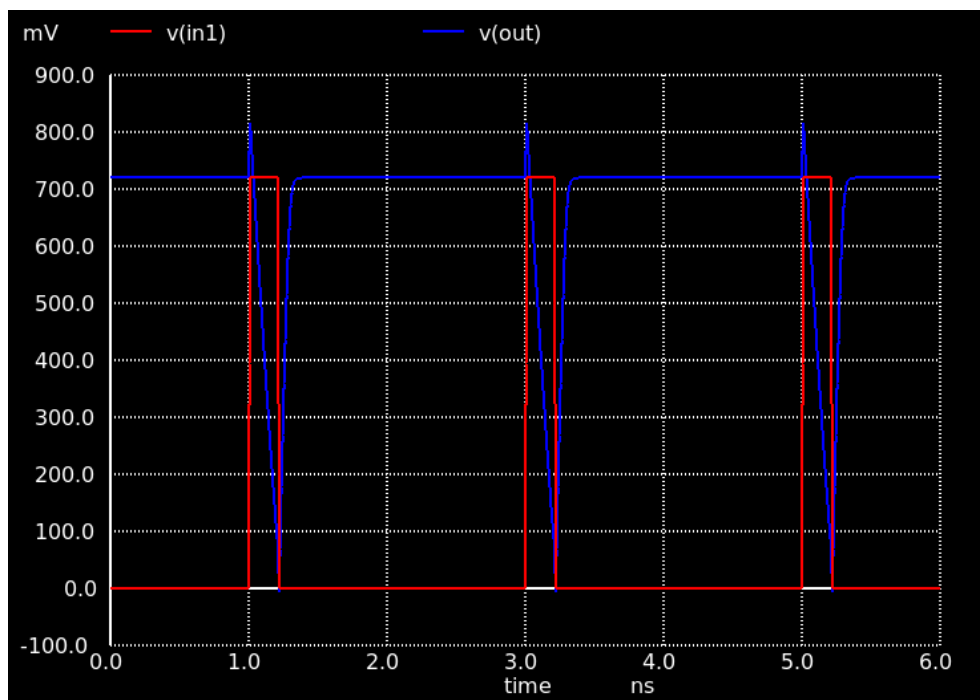
VDD 0.72 V | Cload 5fF

Initial Transient Solution

Node	Voltage
----	-----
vdd	0.72
in1	0
in2	0.72
out	0.72
n1	1.859e-08
vin2#branch	-3.8273e-12
vin1#branch	3.91845e-12
vdd#branch	-1.79678e-11

Reference value : 4.50550e-09  
No. of Data Rows : 6044  
Doing analysis at TEMP = 27.000000 and TNOM = 27.000000

tphl\_in1 = 1.207319e-10 targ= 1.125732e-09 trig= 1.005000e-09  
tplh\_in1 = 4.037380e-11 targ= 1.255374e-09 trig= 1.215000e-09  
tphl\_in1\_ps = 1.207319e+02  
tplh\_in1\_ps = 4.037380e+01



VDD 0.8V | C = 5 fF

Circuit:

Doing analysis at TEMP = 27.000000 and TNOM = 27.000000

Initial Transient Solution

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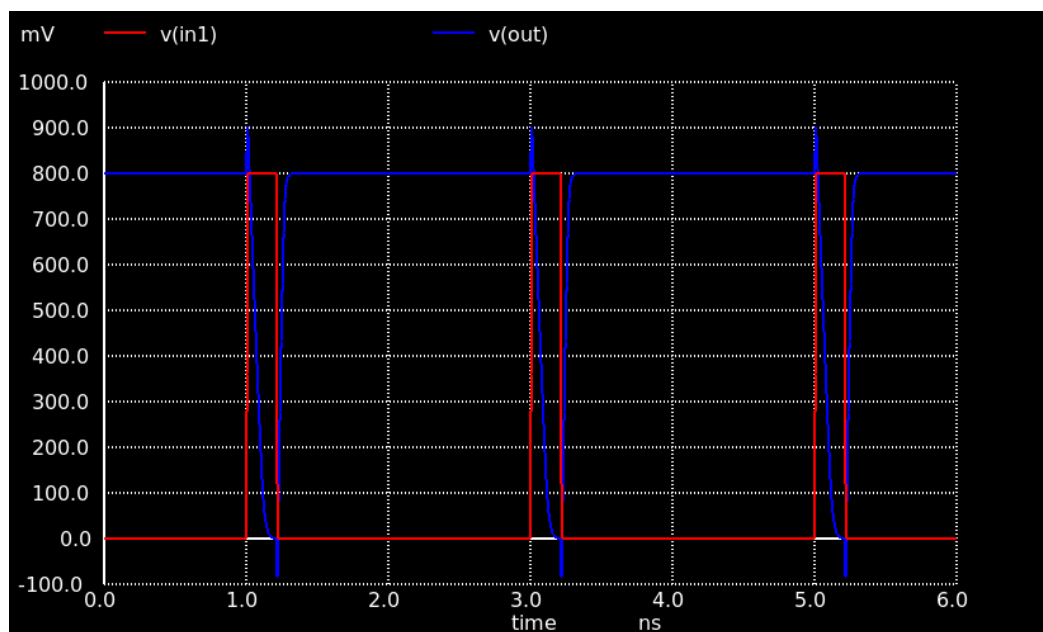
Node	Voltage
----	-----
vdd	0.8
in1	0
in2	0.8
out	0.8
n1	1.6761e-08
vin2#branch	-1.00853e-11
vin1#branch	8.54681e-12
vdd#branch	-2.47342e-11

Reference value : 2.98050e-09

No. of Data Rows : 6044

Doing analysis at TEMP = 27.000000 and TNOM = 27.000000

tphl\_in1 = 6.832509e-11 targ= 1.073325e-09 trig= 1.005000e-09  
tplh\_in1 = 2.941615e-11 targ= 1.244416e-09 trig= 1.215000e-09  
tphl\_in1\_ps = 6.832509e+01  
tplh\_in1\_ps = 2.941615e+01



VDD 0.88V | Cload 5fF

Initial Transient Solution

Node	Voltage
vdd	0.88
in1	0
in2	0.88
out	0.88
n1	1.84657e-08
vin2#branch	-2.14625e-11
vin1#branch	1.59791e-11
vdd#branch	-3.46228e-11

Reference value : 2.98750e-09

No. of Data Rows : 6044

Doing analysis at TEMP = 27.000000 and TNOM = 27.000000

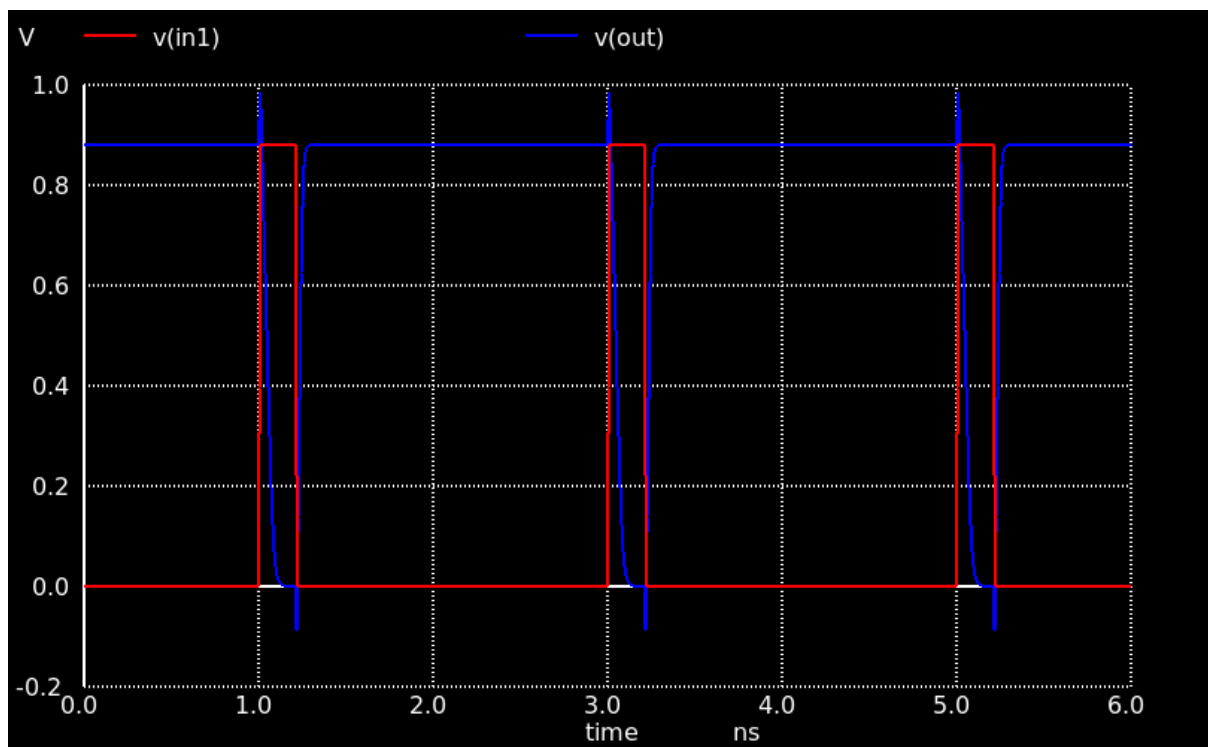
Warning: vin1: no DC value, transient time 0 value used

tphl\_in1 = 4.703450e-11 targ= 1.052034e-09 trig= 1.005000e-09

tplh\_in1 = 2.189480e-11 targ= 1.236895e-09 trig= 1.215000e-09

tphl\_in1\_ps = 4.703450e+01

tplh\_in1\_ps = 2.189480e+01



## NAND2 | Batch mode

Enter your simulation request: nand2 vdd 0.8, temps -40,25,110 C, load 10 fF

WARNING: All log messages before absl::InitializeLog() is called are written to STDERR

E0000 00:00:1760408781.555175 171972 alts\_credentials.cc:93] ALTS creds ignored. Not running on GCP and untrusted ALTS is not enabled.

Parsed params: {'gate': 'nand2', 'vdd': 0.8, 'temperature': -40, 'sweep': [-40, 25, 110], 'load\_cap': 'Cl out 0 10fF'}

Running batch @ TEMP=-40C ...

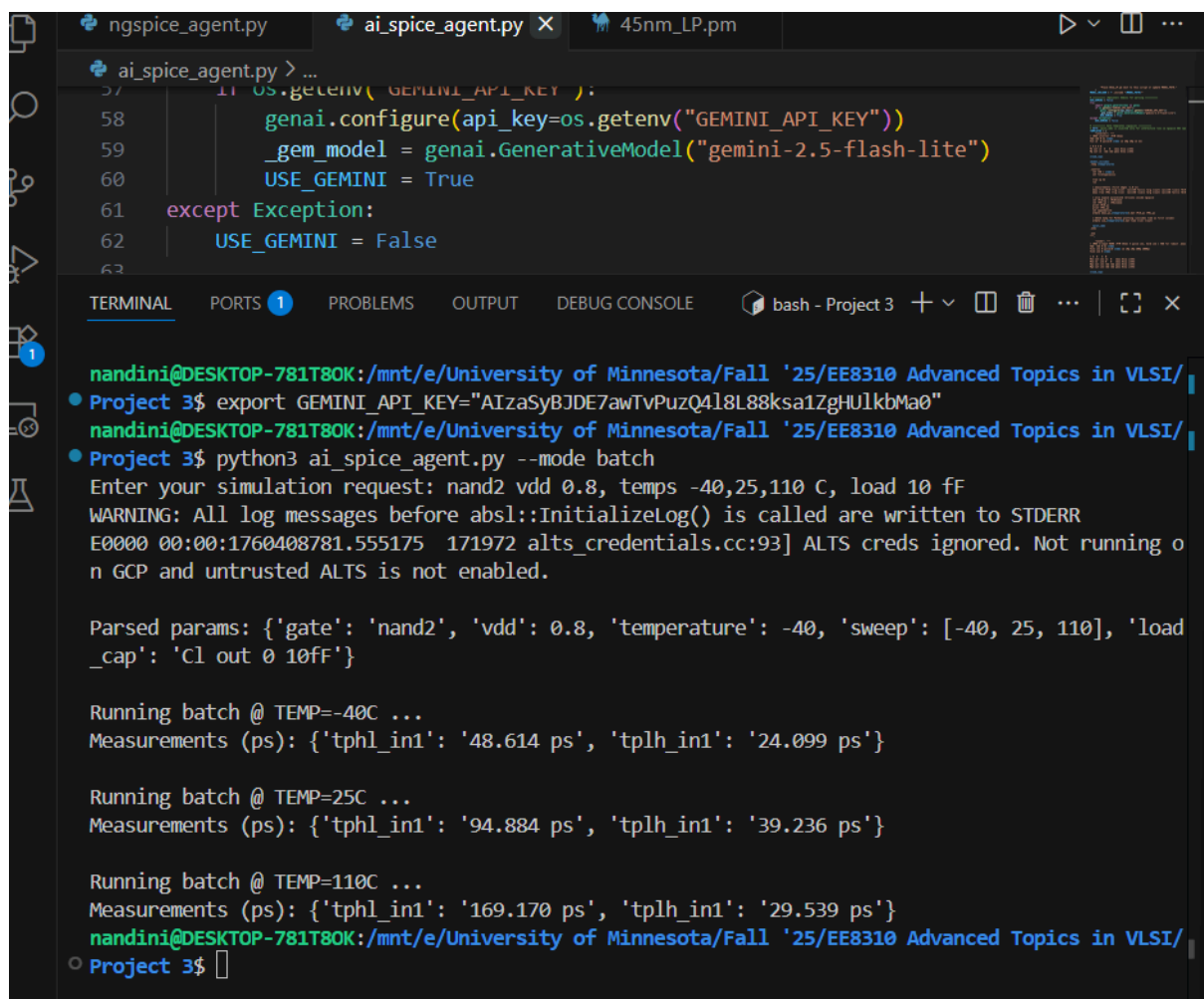
Measurements (ps): {'tphl\_in1': '48.614 ps', 'tplh\_in1': '24.099 ps'}

Running batch @ TEMP=25C ...

Measurements (ps): {'tphl\_in1': '94.884 ps', 'tplh\_in1': '39.236 ps'}

Running batch @ TEMP=110C ...

Measurements (ps): {'tphl\_in1': '169.170 ps', 'tplh\_in1': '29.539 ps'}



The screenshot shows a VS Code editor with three tabs: `ngspice_agent.py`, `ai_spice_agent.py`, and `45nm_LP.pm`. The `ai_spice_agent.py` tab is active, displaying a Python script that configures the Gemini API and handles exceptions. Below the editor, the `TERMINAL` panel shows the execution of the script. The terminal output includes the same text as the previous blocks, showing the simulation request, warnings, parsed parameters, and measurements at three different temperatures: -40C, 25C, and 110C. The prompt at the bottom indicates the user is in the `Project 3` directory.

```
ngspice_agent.py  ai_spice_agent.py X  45nm_LP.pm
ai_spice_agent.py > ...
57  if os.getenv("GEMINI_API_KEY"):
58      genai.configure(api_key=os.getenv("GEMINI_API_KEY"))
59      _gem_model = genai.GenerativeModel("gemini-2.5-flash-lite")
60      USE_GEMINI = True
61  except Exception:
62      USE_GEMINI = False
63

TERMINAL  PORTS 1  PROBLEMS  OUTPUT  DEBUG CONSOLE  bash - Project 3
nandini@DESKTOP-781T80K:/mnt/e/University of Minnesota/Fall '25/EE8310 Advanced Topics in VLSI/
• Project 3$ export GEMINI_API_KEY="AIzaSyBJDE7awTVpuzQ418L88ksa1ZgHULkbMa0"
nandini@DESKTOP-781T80K:/mnt/e/University of Minnesota/Fall '25/EE8310 Advanced Topics in VLSI/
• Project 3$ python3 ai_spice_agent.py --mode batch
Enter your simulation request: nand2 vdd 0.8, temps -40,25,110 C, load 10 fF
WARNING: All log messages before absl::InitializeLog() is called are written to STDERR
E0000 00:00:1760408781.555175 171972 alts_credentials.cc:93] ALTS creds ignored. Not running o
n GCP and untrusted ALTS is not enabled.

Parsed params: {'gate': 'nand2', 'vdd': 0.8, 'temperature': -40, 'sweep': [-40, 25, 110], 'load
_cap': 'Cl out 0 10fF'}

Running batch @ TEMP=-40C ...
Measurements (ps): {'tphl_in1': '48.614 ps', 'tplh_in1': '24.099 ps'}

Running batch @ TEMP=25C ...
Measurements (ps): {'tphl_in1': '94.884 ps', 'tplh_in1': '39.236 ps'}

Running batch @ TEMP=110C ...
Measurements (ps): {'tphl_in1': '169.170 ps', 'tplh_in1': '29.539 ps'}
nandini@DESKTOP-781T80K:/mnt/e/University of Minnesota/Fall '25/EE8310 Advanced Topics in VLSI/
○ Project 3$
```

## INVERTER Sweeping Capacitance

Project 3\$ python3 ai\_spice\_agent.py --mode batch

*Enter your simulation request: inverter vdd 0.8 V, temp 25 C, load 5-50 fF step 5 fF*

WARNING: All log messages before absl::InitializeLog() is called are written to STDERR

E0000 00:00:1760410434.589810 184691 alts\_credentials.cc:93] ALTS creds ignored. Not running on GCP and untrusted ALTS is not enabled.

Parsed params: {'gate': 'inverter', 'vdd': 0.8, 'temperature': 5, 'sweep': [5, 10, 15, 20, 25, 30, 35, 40, 45, 50], 'load\_cap': 'Cl out 0 5-50 fF', 'loads\_list': ['5fF', '10fF', '15fF', '20fF', '25fF', '30fF', '35fF', '40fF', '45fF', '50fF']}

Running batch @ TEMP=5C, Cload=5fF ...

Measurements (ps): {'tphl': '25.737 ps', 'tphl': '29.052 ps'}

Running batch @ TEMP=5C, Cload=10fF ...

Measurements (ps): {'tphl': '35.678 ps', 'tphl': '40.493 ps'}

Running batch @ TEMP=5C, Cload=15fF ...

Measurements (ps): {'tphl': '45.521 ps', 'tphl': '51.787 ps'}

Running batch @ TEMP=5C, Cload=20fF ...

Measurements (ps): {'tphl': '55.331 ps', 'tphl': '63.028 ps'}

Running batch @ TEMP=5C, Cload=25fF ...

Measurements (ps): {'tphl': '65.123 ps', 'tphl': '74.243 ps'}

Running batch @ TEMP=5C, Cload=30fF ...

Measurements (ps): {'tphl': '74.906 ps', 'tphl': '85.446 ps'}

Running batch @ TEMP=5C, Cload=35fF ...

Measurements (ps): {'tphl': '84.683 ps', 'tphl': '96.640 ps'}

Running batch @ TEMP=5C, Cload=40fF ...

Measurements (ps): {'tphl': '94.457 ps', 'tphl': '107.829 ps'}

Running batch @ TEMP=5C, Cload=45fF ...

Measurements (ps): {'tphl': '104.228 ps', 'tphl': '119.014 ps'}

Running batch @ TEMP=5C, Cload=50fF ...

Measurements (ps): {'tphl': '113.998 ps', 'tphl': '130.197 ps'}

Running batch @ TEMP=10C, Cload=5fF ...

Measurements (ps): {'tphl': '26.538 ps', 'tphl': '29.908 ps'}

Running batch @ TEMP=10C, Cload=10fF ...



Measurements (ps): {'tplh': '36.902 ps', 'tphl': '41.781 ps'}

Running batch @ TEMP=10C, Cload=15fF ...

Measurements (ps): {'tplh': '47.164 ps', 'tphl': '53.502 ps'}

Running batch @ TEMP=10C, Cload=20fF ...

Measurements (ps): {'tplh': '57.390 ps', 'tphl': '65.170 ps'}

Running batch @ TEMP=10C, Cload=25fF ...

Measurements (ps): {'tplh': '67.600 ps', 'tphl': '76.812 ps'}

Running batch @ TEMP=10C, Cload=30fF ...

Measurements (ps): {'tplh': '77.800 ps', 'tphl': '88.441 ps'}

Running batch @ TEMP=10C, Cload=35fF ...

Measurements (ps): {'tplh': '87.994 ps', 'tphl': '100.061 ps'}

Running batch @ TEMP=10C, Cload=40fF ...

Measurements (ps): {'tplh': '98.185 ps', 'tphl': '111.676 ps'}

Running batch @ TEMP=10C, Cload=45fF ...

Measurements (ps): {'tplh': '108.373 ps', 'tphl': '123.287 ps'}

Running batch @ TEMP=10C, Cload=50fF ...

Measurements (ps): {'tplh': '118.559 ps', 'tphl': '134.896 ps'}

Running batch @ TEMP=15C, Cload=5fF ...

Measurements (ps): {'tplh': '27.356 ps', 'tphl': '30.779 ps'}

Running batch @ TEMP=15C, Cload=10fF ...

Measurements (ps): {'tplh': '38.148 ps', 'tphl': '43.092 ps'}

Running batch @ TEMP=15C, Cload=15fF ...

Measurements (ps): {'tplh': '48.836 ps', 'tphl': '55.249 ps'}

Running batch @ TEMP=15C, Cload=20fF ...

Measurements (ps): {'tplh': '59.487 ps', 'tphl': '67.351 ps'}

Running batch @ TEMP=15C, Cload=25fF ...

Measurements (ps): {'tplh': '70.121 ps', 'tphl': '79.427 ps'}

Running batch @ TEMP=15C, Cload=30fF ...

Measurements (ps): {'tplh': '80.746 ps', 'tphl': '91.490 ps'}

Running batch @ TEMP=15C, Cload=35fF ...

Measurements (ps): {'tplh': '91.364 ps', 'tphl': '103.544 ps'}

Running batch @ TEMP=15C, Cload=40fF ...

Measurements (ps): {'tplh': '101.980 ps', 'tphl': '115.593 ps'}

Running batch @ TEMP=15C, Cload=45fF ...

Measurements (ps): {'tplh': '112.592 ps', 'tphl': '127.638 ps'}

Running batch @ TEMP=15C, Cload=50fF ...

Measurements (ps): {'tplh': '123.202 ps', 'tphl': '139.681 ps'}

Running batch @ TEMP=20C, Cload=5fF ...

Measurements (ps): {'tplh': '28.188 ps', 'tphl': '31.666 ps'}

Running batch @ TEMP=20C, Cload=10fF ...

Measurements (ps): {'tplh': '39.415 ps', 'tphl': '44.425 ps'}

Running batch @ TEMP=20C, Cload=15fF ...

Measurements (ps): {'tplh': '50.536 ps', 'tphl': '57.026 ps'}

Running batch @ TEMP=20C, Cload=20fF ...

Measurements (ps): {'tplh': '61.620 ps', 'tphl': '69.569 ps'}

Running batch @ TEMP=20C, Cload=25fF ...

Measurements (ps): {'tplh': '72.686 ps', 'tphl': '82.088 ps'}

Running batch @ TEMP=20C, Cload=30fF ...

Measurements (ps): {'tplh': '83.742 ps', 'tphl': '94.592 ps'}

Running batch @ TEMP=20C, Cload=35fF ...

Measurements (ps): {'tplh': '94.792 ps', 'tphl': '107.088 ps'}

Running batch @ TEMP=20C, Cload=40fF ...

Measurements (ps): {'tplh': '105.839 ps', 'tphl': '119.578 ps'}

Running batch @ TEMP=20C, Cload=45fF ...

Measurements (ps): {'tplh': '116.883 ps', 'tphl': '132.064 ps'}

Running batch @ TEMP=20C, Cload=50fF ...

Measurements (ps): {'tplh': '127.925 ps', 'tphl': '144.548 ps'}

Running batch @ TEMP=25C, Cload=5fF ...

Measurements (ps): {'tplh': '29.034 ps', 'tphl': '32.567 ps'}

Running batch @ TEMP=25C, Cload=10fF ...

Measurements (ps): {'tplh': '40.704 ps', 'tphl': '45.781 ps'}

Running batch @ TEMP=25C, Cload=15fF ...

Measurements (ps): {'tplh': '52.265 ps', 'tphl': '58.831 ps'}

Running batch @ TEMP=25C, Cload=20fF ...

Measurements (ps): {'tplh': '63.788 ps', 'tphl': '71.825 ps'}

Running batch @ TEMP=25C, Cload=25fF ...

Measurements (ps): {'tplh': '75.293 ps', 'tphl': '84.792 ps'}

Running batch @ TEMP=25C, Cload=30fF ...

Measurements (ps): {'tplh': '86.788 ps', 'tphl': '97.745 ps'}

Running batch @ TEMP=25C, Cload=35fF ...

Measurements (ps): {'tplh': '98.277 ps', 'tphl': '110.689 ps'}

Running batch @ TEMP=25C, Cload=40fF ...

Measurements (ps): {'tplh': '109.762 ps', 'tphl': '123.628 ps'}

Running batch @ TEMP=25C, Cload=45fF ...

Measurements (ps): {'tplh': '121.244 ps', 'tphl': '136.563 ps'}

Running batch @ TEMP=25C, Cload=50fF ...

Measurements (ps): {'tplh': '132.725 ps', 'tphl': '149.495 ps'}

Running batch @ TEMP=30C, Cload=5fF ...

Measurements (ps): {'tplh': '29.893 ps', 'tphl': '33.483 ps'}

Running batch @ TEMP=30C, Cload=10fF ...

Measurements (ps): {'tplh': '42.014 ps', 'tphl': '47.158 ps'}

Running batch @ TEMP=30C, Cload=15fF ...

Measurements (ps): {'tplh': '54.022 ps', 'tphl': '60.666 ps'}

Running batch @ TEMP=30C, Cload=20fF ...

Measurements (ps): {'tplh': '65.991 ps', 'tphl': '74.116 ps'}

Running batch @ TEMP=30C, Cload=25fF ...

Measurements (ps): {'tplh': '77.941 ps', 'tphl': '87.539 ps'}

Running batch @ TEMP=30C, Cload=30fF ...

Measurements (ps): {'tplh': '89.882 ps', 'tphl': '100.948 ps'}

Running batch @ TEMP=30C, Cload=35fF ...

Measurements (ps): {'tplh': '101.817 ps', 'tphl': '114.348 ps'}

Running batch @ TEMP=30C, Cload=40fF ...

Measurements (ps): {'tplh': '113.747 ps', 'tphl': '127.743 ps'}

Running batch @ TEMP=30C, Cload=45fF ...

Measurements (ps): {'tplh': '125.675 ps', 'tphl': '141.133 ps'}

Running batch @ TEMP=30C, Cload=50fF ...

Measurements (ps): {'tplh': '137.601 ps', 'tphl': '154.521 ps'}

Running batch @ TEMP=35C, Cload=5fF ...

Measurements (ps): {'tplh': '30.766 ps', 'tphl': '34.413 ps'}

Running batch @ TEMP=35C, Cload=10fF ...

Measurements (ps): {'tplh': '43.343 ps', 'tphl': '48.555 ps'}

Running batch @ TEMP=35C, Cload=15fF ...

Measurements (ps): {'tplh': '55.806 ps', 'tphl': '62.528 ps'}

Running batch @ TEMP=35C, Cload=20fF ...

Measurements (ps): {'tplh': '68.227 ps', 'tphl': '76.441 ps'}

Running batch @ TEMP=35C, Cload=25fF ...

Measurements (ps): {'tplh': '80.631 ps', 'tphl': '90.328 ps'}

Running batch @ TEMP=35C, Cload=30fF ...

Measurements (ps): {'tplh': '93.024 ps', 'tphl': '104.200 ps'}

Running batch @ TEMP=35C, Cload=35fF ...

Measurements (ps): {'tplh': '105.411 ps', 'tphl': '118.062 ps'}

Running batch @ TEMP=35C, Cload=40fF ...

Measurements (ps): {'tplh': '117.794 ps', 'tphl': '131.919 ps'}

Running batch @ TEMP=35C, Cload=45fF ...

Measurements (ps): {'tplh': '130.174 ps', 'tphl': '145.773 ps'}

Running batch @ TEMP=35C, Cload=50fF ...

Measurements (ps): {'tplh': '142.552 ps', 'tphl': '159.623 ps'}

Running batch @ TEMP=40C, Cload=5fF ...

Measurements (ps): {'tplh': '31.652 ps', 'tphl': '35.357 ps'}

Running batch @ TEMP=40C, Cload=10fF ...

Measurements (ps): {'tplh': '44.693 ps', 'tphl': '49.975 ps'}

Running batch @ TEMP=40C, Cload=15fF ...

Measurements (ps): {'tplh': '57.616 ps', 'tphl': '64.418 ps'}

Running batch @ TEMP=40C, Cload=20fF ...

Measurements (ps): {'tplh': '70.497 ps', 'tphl': '78.802 ps'}

Running batch @ TEMP=40C, Cload=25fF ...

Measurements (ps): {'tplh': '83.360 ps', 'tphl': '93.158 ps'}

Running batch @ TEMP=40C, Cload=30fF ...

Measurements (ps): {'tph': '96.213 ps', 'tphl': '107.499 ps'}

Running batch @ TEMP=40C, Cload=35fF ...

Measurements (ps): {'tph': '109.059 ps', 'tphl': '121.831 ps'}

Running batch @ TEMP=40C, Cload=40fF ...

Measurements (ps): {'tph': '121.901 ps', 'tphl': '136.157 ps'}

Running batch @ TEMP=40C, Cload=45fF ...

Measurements (ps): {'tph': '134.740 ps', 'tphl': '150.479 ps'}

Running batch @ TEMP=40C, Cload=50fF ...

Measurements (ps): {'tph': '147.577 ps', 'tphl': '164.799 ps'}

Running batch @ TEMP=45C, Cload=5fF ...

Measurements (ps): {'tph': '32.551 ps', 'tphl': '36.315 ps'}

Running batch @ TEMP=45C, Cload=10fF ...

Measurements (ps): {'tph': '46.063 ps', 'tphl': '51.413 ps'}

Running batch @ TEMP=45C, Cload=15fF ...

Measurements (ps): {'tph': '59.453 ps', 'tphl': '66.334 ps'}

Running batch @ TEMP=45C, Cload=20fF ...

Measurements (ps): {'tph': '72.801 ps', 'tphl': '81.195 ps'}

Running batch @ TEMP=45C, Cload=25fF ...

Measurements (ps): {'tph': '86.129 ps', 'tphl': '96.027 ps'}

Running batch @ TEMP=45C, Cload=30fF ...

Measurements (ps): {'tph': '99.447 ps', 'tphl': '110.844 ps'}

Running batch @ TEMP=45C, Cload=35fF ...

Measurements (ps): {'tph': '112.759 ps', 'tphl': '125.652 ps'}

Running batch @ TEMP=45C, Cload=40fF ...

Measurements (ps): {'tph': '126.067 ps', 'tphl': '140.454 ps'}

Running batch @ TEMP=45C, Cload=45fF ...

Measurements (ps): {'tph': '139.371 ps', 'tphl': '155.252 ps'}

Running batch @ TEMP=45C, Cload=50fF ...

Measurements (ps): {'tph': '152.674 ps', 'tphl': '170.048 ps'}

Running batch @ TEMP=50C, Cload=5fF ...

Measurements (ps): {'tph': '33.464 ps', 'tphl': '37.286 ps'}

Running batch @ TEMP=50C, Cload=10fF ...

Measurements (ps): {'tplh': '47.452 ps', 'tphl': '52.872 ps'}

Running batch @ TEMP=50C, Cload=15fF ...

Measurements (ps): {'tplh': '61.316 ps', 'tphl': '68.277 ps'}

Running batch @ TEMP=50C, Cload=20fF ...

Measurements (ps): {'tplh': '75.137 ps', 'tphl': '83.620 ps'}

Running batch @ TEMP=50C, Cload=25fF ...

Measurements (ps): {'tplh': '88.938 ps', 'tphl': '98.935 ps'}

Running batch @ TEMP=50C, Cload=30fF ...

Measurements (ps): {'tplh': '102.728 ps', 'tphl': '114.235 ps'}

Running batch @ TEMP=50C, Cload=35fF ...

Measurements (ps): {'tplh': '116.511 ps', 'tphl': '129.525 ps'}

Running batch @ TEMP=50C, Cload=40fF ...

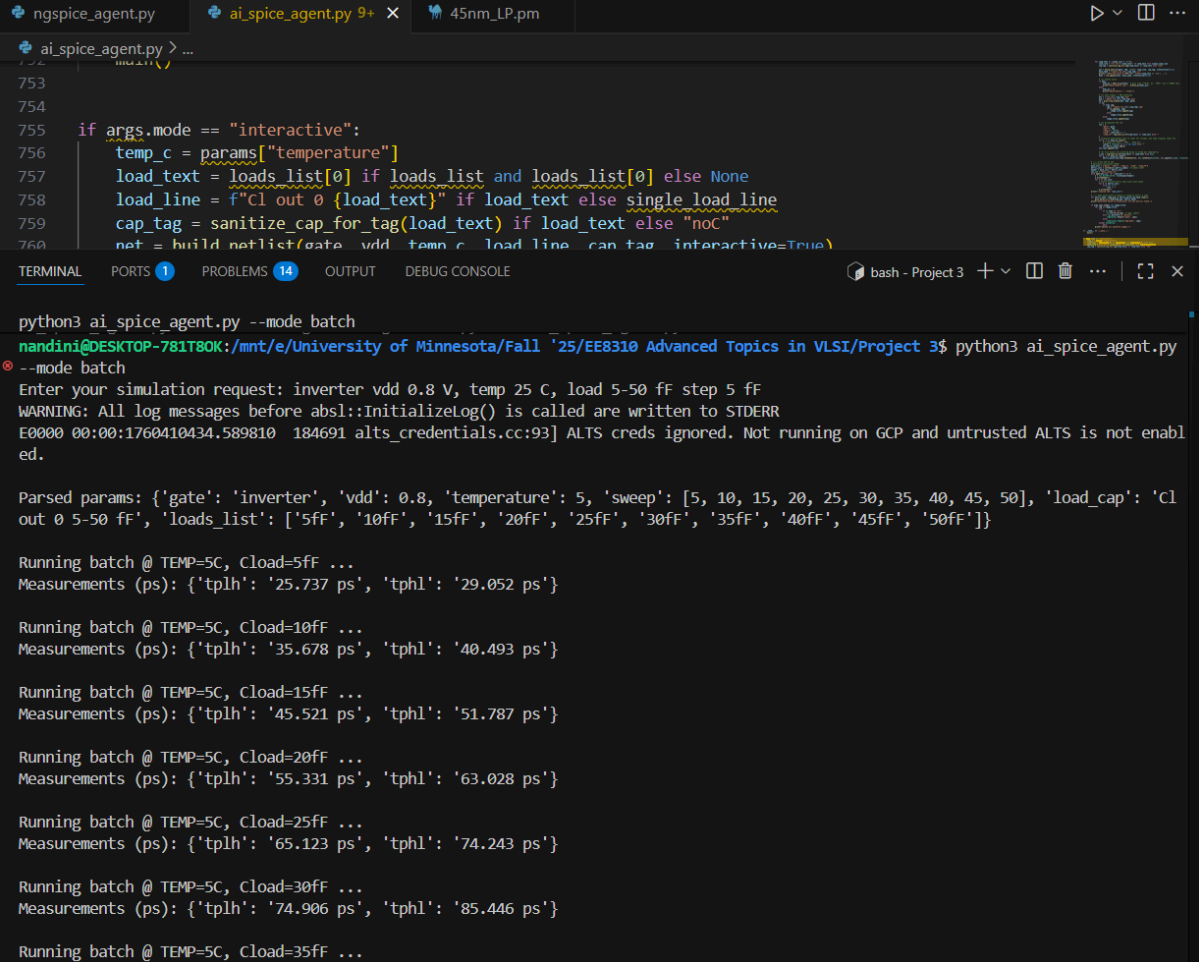
Measurements (ps): {'tplh': '130.291 ps', 'tphl': '144.810 ps'}

Running batch @ TEMP=50C, Cload=45fF ...

Measurements (ps): {'tplh': '144.068 ps', 'tphl': '160.090 ps'}

Running batch @ TEMP=50C, Cload=50fF ...

Measurements (ps): {'tplh': '157.842 ps', 'tphl': '175.367 ps'}



The screenshot shows a VS Code editor with a Python file named `ai_spice_agent.py` and a terminal window. The Python code defines an interactive mode where a user can specify simulation parameters like temperature, load, and gate. The terminal shows the execution of the script in batch mode, where it automatically runs simulations for various load values (5ff to 50ff) at a temperature of 5C. The output for each batch run shows the propagation delay (t<sub>plh</sub>) and the rise time (t<sub>phl</sub>) in picoseconds.

```
753
754
755 if args.mode == "interactive":
756     temp_c = params["temperature"]
757     load_text = loads_list[0] if loads_list and loads_list[0] else None
758     load_line = f"Cl out 0 {load_text}" if load_text else single_load_line
759     cap_tag = sanitize_cap_for_tag(load_text) if load_text else "noc"
760     net = build_netlist(gate, vdd, temp_c, load_line, cap_tag, interactive=True)
```

python3 ai\_spice\_agent.py --mode batch  
nandini@DESKTOP-781T80K:/mnt/e/University of Minnesota/Fall '25/EE8310 Advanced Topics in VLSI/Project 3\$ python3 ai\_spice\_agent.py  
--mode batch  
Enter your simulation request: inverter vdd 0.8 V, temp 25 C, load 5-50 fF step 5 fF  
WARNING: All log messages before absl::InitializeLog() is called are written to STDERR  
E0000 00:00:1760410434.589810 184691 alts\_credentials.cc:93] ALTS creds ignored. Not running on GCP and untrusted ALTS is not enabled.  
  
Parsed params: {'gate': 'inverter', 'vdd': 0.8, 'temperature': 5, 'sweep': [5, 10, 15, 20, 25, 30, 35, 40, 45, 50], 'load\_cap': 'Cl out 0 5-50 fF', 'loads\_list': ['5ff', '10ff', '15ff', '20ff', '25ff', '30ff', '35ff', '40ff', '45ff', '50ff']}

Running batch @ TEMP=5C, Cload=5ff ...  
Measurements (ps): {'tplh': '25.737 ps', 'tphl': '29.052 ps'}

Running batch @ TEMP=5C, Cload=10ff ...  
Measurements (ps): {'tplh': '35.678 ps', 'tphl': '40.493 ps'}

Running batch @ TEMP=5C, Cload=15ff ...  
Measurements (ps): {'tplh': '45.521 ps', 'tphl': '51.787 ps'}

Running batch @ TEMP=5C, Cload=20ff ...  
Measurements (ps): {'tplh': '55.331 ps', 'tphl': '63.028 ps'}

Running batch @ TEMP=5C, Cload=25ff ...  
Measurements (ps): {'tplh': '65.123 ps', 'tphl': '74.243 ps'}

Running batch @ TEMP=5C, Cload=30ff ...  
Measurements (ps): {'tplh': '74.906 ps', 'tphl': '85.446 ps'}

Running batch @ TEMP=5C, Cload=35ff ...

These values were dumped in a .csv file.