Names: Mike Pauls, Jayati Singh, Austin Lee
NetIds: mepauls2, jayati, sal3
Team name: team_name
School: On-campus

Kernels (>90% of program time):

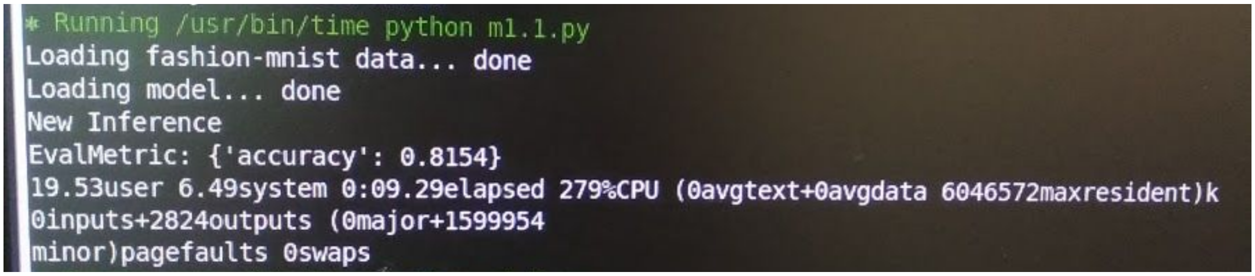
```
            32.06%  35.969ms        20  1.7984ms  1.1200us  33.609ms  [CUDA memcpy HtoD]
            17.88%  20.062ms         1  20.062ms  20.062ms  20.062ms
volta_scudnn_128x64_relu_interior_nn_v1
            17.16%  19.252ms         4  4.8129ms  4.8122ms  4.8133ms
volta_gcgemm_64x32_nt
             8.53%  9.5671ms         4  2.3918ms  2.0052ms  3.1255ms  void
fft2d_c2r_32x32<float, bool=0, bool=0, unsigned int=0, bool=0, bool=0>(float*, float2 const *, int,
int, int, int, int, int, int, int, int, float, float, cudnn::reduced_divisor, bool, float*, float*, int2, int, int)
             7.80%  8.7556ms         1  8.7556ms  8.7556ms  8.7556ms
volta_sgemm_128x128_tn
             6.42%  7.2052ms         2  3.6026ms  25.536us  7.1797ms  void
op_generic_tensor_kernel<int=2, float, float, float, int=256, cudnnGenericOp_t=7,
cudnnNanPropagation_t=0, cudnnDimOrder_t=0, int=1>(cudnnTensorStruct, float*,
cudnnTensorStruct, float const *, cudnnTensorStruct, float const *, float, float, float, float,
dimArray, reducedDivisorArray)
             5.70%  6.3895ms         4  1.5974ms  1.2742ms  2.0207ms  void
fft2d_r2c_32x32<float, bool=0, unsigned int=0, bool=0>(float2*, float const *, int, int, int, int, int,
int, int, int, int, cudnn::reduced_divisor, bool, int2, int, int)
             3.88%  4.3527ms         1  4.3527ms  4.3527ms  4.3527ms  void
cudnn::detail::pooling_fw_4d_kernel<float, float, cudnn::detail::maxpooling_func<float,
cudnnNanPropagation_t=0>, int=0, bool=0>(cudnnTensorStruct, float const *,
cudnn::detail::pooling_fw_4d_kernel<float, float, cudnn::detail::maxpooling_func<float,
cudnnNanPropagation_t=0>, int=0, bool=0>, cudnnTensorStruct*, cudnnPoolingStruct, float,
cudnnPoolingStruct, int, cudnn::reduced_divisor, float)
```

CUDA API Calls (>90% program time):

```
            41.41%  3.08766s        22  140.35ms  14.396us  1.61488s
cudaStreamCreateWithFlags
            33.15%  2.47141s        24  102.98ms  55.402us  2.46633s  cudaMemGetInfo
            21.17%  1.57836s        19  83.072ms  1.2440us  421.47ms  cudaFree
```

Kernels vs. API:
CUDA API calls are instructions (cudaMemcpy, cudaGetDevice, etc.) that are used by the host to create and communicate with the kernels, while GPU Activities (kernels) are the actual instructions in the kernel that run during each invocation.

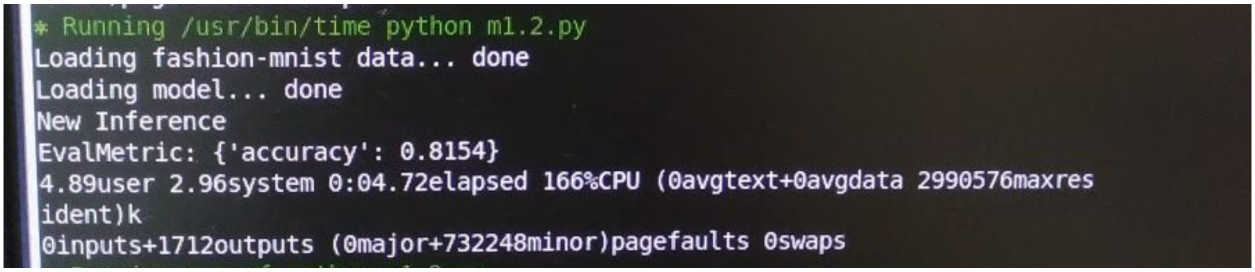
Rai running MXNet on the CPU:



```
* Running /usr/bin/time python m1.1.py
Loading fashion-mnist data... done
Loading model... done
New Inference
EvalMetric: {'accuracy': 0.8154}
19.53user 6.49system 0:09.29elapsed 279%CPU (0avgtext+0avgdata 6046572maxresident)k
0inputs+2824outputs (0major+1599954
minor)pagefaults 0swaps
```

Program run time:
User: 19.53 seconds
System: 6.49 seconds
Elapsed: 0:09.29

Rai running MXNet on the GPU:



```
* Running /usr/bin/time python m1.2.py
Loading fashion-mnist data... done
Loading model... done
New Inference
EvalMetric: {'accuracy': 0.8154}
4.89user 2.96system 0:04.72elapsed 166%CPU (0avgtext+0avgdata 2990576maxres
ident)k
0inputs+1712outputs (0major+732248minor)pagefaults 0swaps
```

Program run time:
User: 4.89 seconds
System: 2.96 seconds
Elapsed: 0:04.72

Whole program execution time:
<u>New Inference:10000</u>
User: 88.36 seconds
System: 10.38 seconds
Elapsed: 1:16.79 seconds
Op Time: 11.134082 seconds
Op Time: 61.390580 seconds
Correctness: 0.7653 Model: ece408

<u>New Inference:1000</u>
User: 18.35 seconds
System: 2.70 seconds
Elapsed: 0:11.22
Op Time: 1.317549
Op Time: 6.760934
Correctness: 0.767 Model: ece408

New Inference:100

User: 8.61

System: 2.60

Elapsed: 0:03.16

Op Time: 0.119225

Op Time: 0.676391

Correctness: 0.76 Model: ece408