For our artifact, we decided to train a neural network on the MNIST dataset, which is a dataset consisting of handwritten numbers. We created this program on Google Collab and ran this network on a CPU and GPU hardware configurations. The program defines a model using TensorFlow and outputs the time it takes to train, which allows us to compare the performances across hardware types. We attempted to run our model with a TPU configuration, but we were running availability issues with this configuration on Google Collab and thus we were only able to compare the runtimes of the CPU and GPU. Our results prove our understanding that GPUs are faster than CPUs for tasks that can be done in parallel, like graphics and machine learning, because they have many cores designed for such work. They are good at quickly doing many similar calculations at once, whereas CPU's are better for general purpose tasks that don't need parallel processing.

```
Downloading data from https://storage.googleapis.com/tensorflow/tf-keras-datasets/mnist.npz
11490434/11490434 [==============================] - 0s 0us/step
Training on CPU...
Epoch 1/5
1875/1875 [==============================] - 18s 9ms/step - loss: 0.2918 - accuracy: 0.9146
Epoch 2/5
1875/1875 [==============================] - 10s 5ms/step - loss: 0.1400 - accuracy: 0.9584
Epoch 3/5
1875/1875 [==============================] - 10s 5ms/step - loss: 0.1026 - accuracy: 0.9690
Epoch 4/5
1875/1875 [==============================] - 8s 4ms/step - loss: 0.0855 - accuracy: 0.9741
Epoch 5/5
1875/1875 [==============================] - 10s 5ms/step - loss: 0.0731 - accuracy: 0.9769
CPU Time: 58.303492307662964 seconds
```

```
 # of GPUs found: 1
 Training on GPU...
 Epoch 1/5
 1875/1875 [==============================] - 6s 3ms/step - loss: 0.2968 - accuracy: 0.9142
 Epoch 2/5
 1875/1875 [==============================] - 5s 3ms/step - loss: 0.1424 - accuracy: 0.9581
 Epoch 3/5
 1875/1875 [==============================] - 6s 3ms/step - loss: 0.1058 - accuracy: 0.9676
 Epoch 4/5
 1875/1875 [==============================] - 5s 3ms/step - loss: 0.0857 - accuracy: 0.9735
 Epoch 5/5
 1875/1875 [==============================] - 5s 3ms/step - loss: 0.0739 - accuracy: 0.9772
 GPU Time: 28.3310329914093 seconds
```