Beta Presentation
SmartSat™ AI Acceleration in Space

The Capstone Experience

Team Lockheed Martin Space

Susanne Constantkis
Benjamin Kavara
Josiah Klann
Kellen Lear

Department of Computer Science and Engineering
Michigan State University
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Project Overview

• Develop a benchmark script to test different machine learning models
• Collect data by using previous semester’s XRT manager
• Deploy scripts remotely using Tinker application
• Configure ZCU102 to run scripts on boot automatically
• Display results onto a dashboard
System Architecture
Dashboard
PetaLinux Terminal

Starting Network Name Resolution...
[ OK ] Started Network Name Resolution.
[ OK ] Reached target Network.
[ OK ] Reached target Host and Network Name Lookups.
[ OK ] Started NFS status monitor for NFSv2/3 locking..
[ OK ] Started Permit User Sessions...
[ OK ] Started Target Communication Framework agent...
[ OK ] Started Xinetd A Powerful Replacement For Inetd.
[ OK ] Finished Permit User Sessions.
[ OK ] Started Getty on tty1.
[ OK ] Started Serial Getty on ttyPS0.
[ OK ] Reached target Login Prompts.
[ OK ] Started Target Communication Framework agent.
[ OK ] Started dpm-auto-config.service.
[ OK ] Reached target Multi-User System.
[ OK ] Reached target Graphical Interface.
  Starting Record Runlevel Change in UTMP...
[ OK ] Finished Record Runlevel Change in UTMP.

PetaLinux 2022.2_release_S10071807 xilinux-zcu102-20222 ttyPS0

xilinux-zcu102-20222 login: root (automatic login)

root@xilinux-zcu102-20222:~#
ZCU102 Board
Script

```
COM5 - Putty

images script.py script2.py testingImages
root@xilinx-zcu102-20222:~/kellen_test# python3 script2.py
(name: 'quantize_eval_model', op_num: 190, attrs: {'libs_info': {'xcompiler.3.5.0': 'be7bc16b739399070b4526571b1d251757bf0e57', 'xcompiler.3.5.0 : target-factor y.3.5.0': '947d207c09dadab602bealc60ae5edf21fbc6e64', 'xcompiler.3.5.0 : xir.3.5.0': 'ea490eebe8414766bebf74622c6bff0ea576b6d8'}, 'files_md5sum': '/tmp/resnet50_tf_DFUCZDX8G_ISA1_B4096_organ_models': '2999d5e6493abc3bb0f084c781a76aea91', '/workspace/tf_resnetv1.50_imagenet_224_224_6.97G_3.0/quantized/quantize_eval_model.pb': 'c8556b51ac404197e9766d33ef5f13ed8'}, 'origin': 'tensorflow')
input size = (1, 224, 224, 3)
/home/root/kellen_test/testingImages/images/2.jpeg
/home/root/kellen_test/testingImages/images/4.jpeg
/home/root/kellen_test/testingImages/images/1.jpeg
/home/root/kellen_test/testingImages/images/0.jpeg
corkscrew, bottle screw
marimba, xylophone
lycaenid, lycanid butterfly
badger
folding chair
Total Runtime: 5.86 seconds
Average Latency: 0.01 seconds
Throughput: 85.27 inferences/second
root@xilinx-zcu102-20222:~/kellen_test#  
```
What’s left to do?

• Features
  ▪ Deploy Inference Engine on TX2
  ▪ Integrate Inference runtime script with Tinker

• Stretch Goals
  ▪ Application Manager
  ▪ Model Development
  ▪ XRT Monitor

• Other Tasks
  ▪ Compile all deliverables into one folder
Questions?