

MICHIGAN STATE

UNIVERSITY

Beta Presentation

SmartSat™ Software Development Kit & AI Platform

The Capstone Experience

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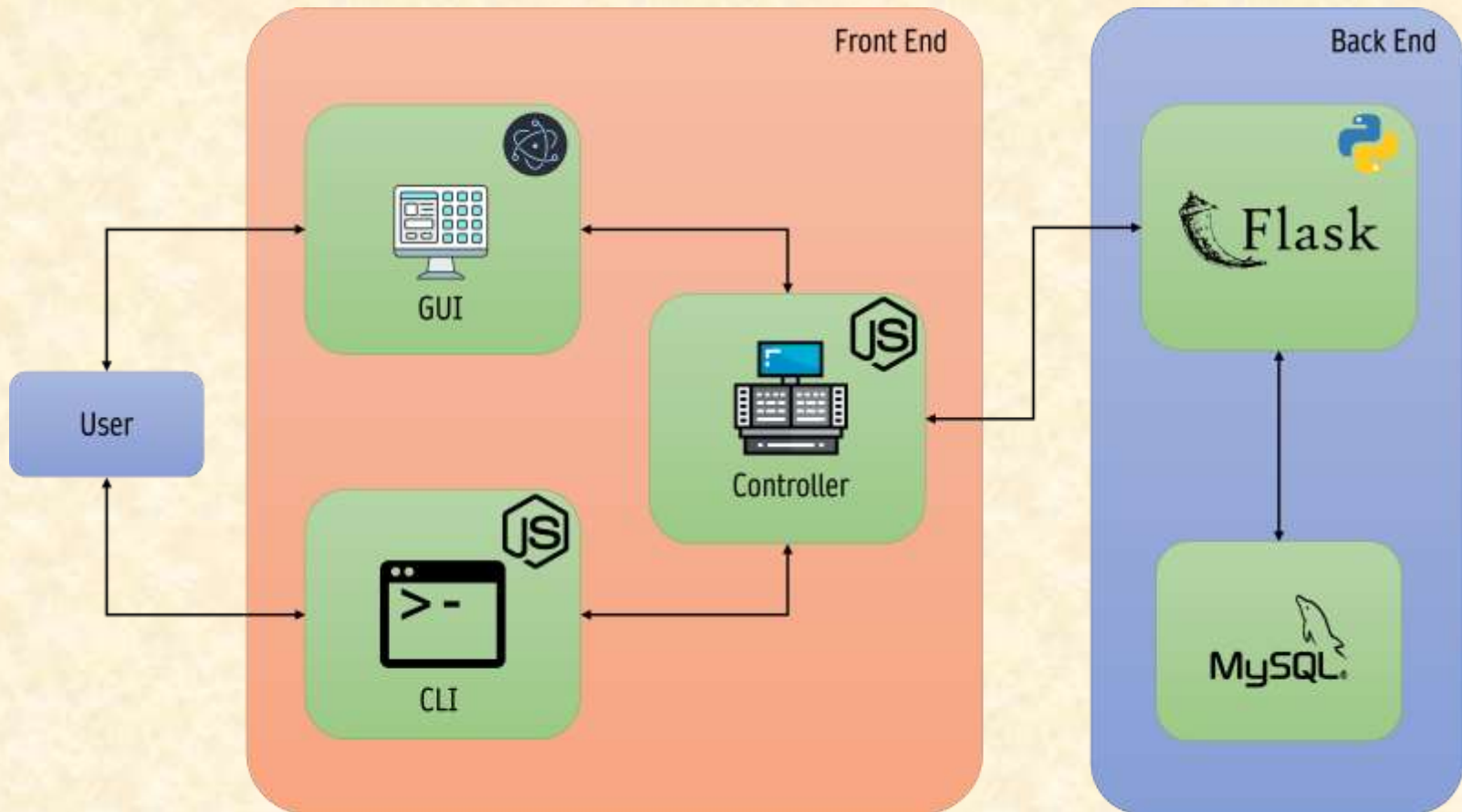
*From Students...
...to Professionals*

Project Overview

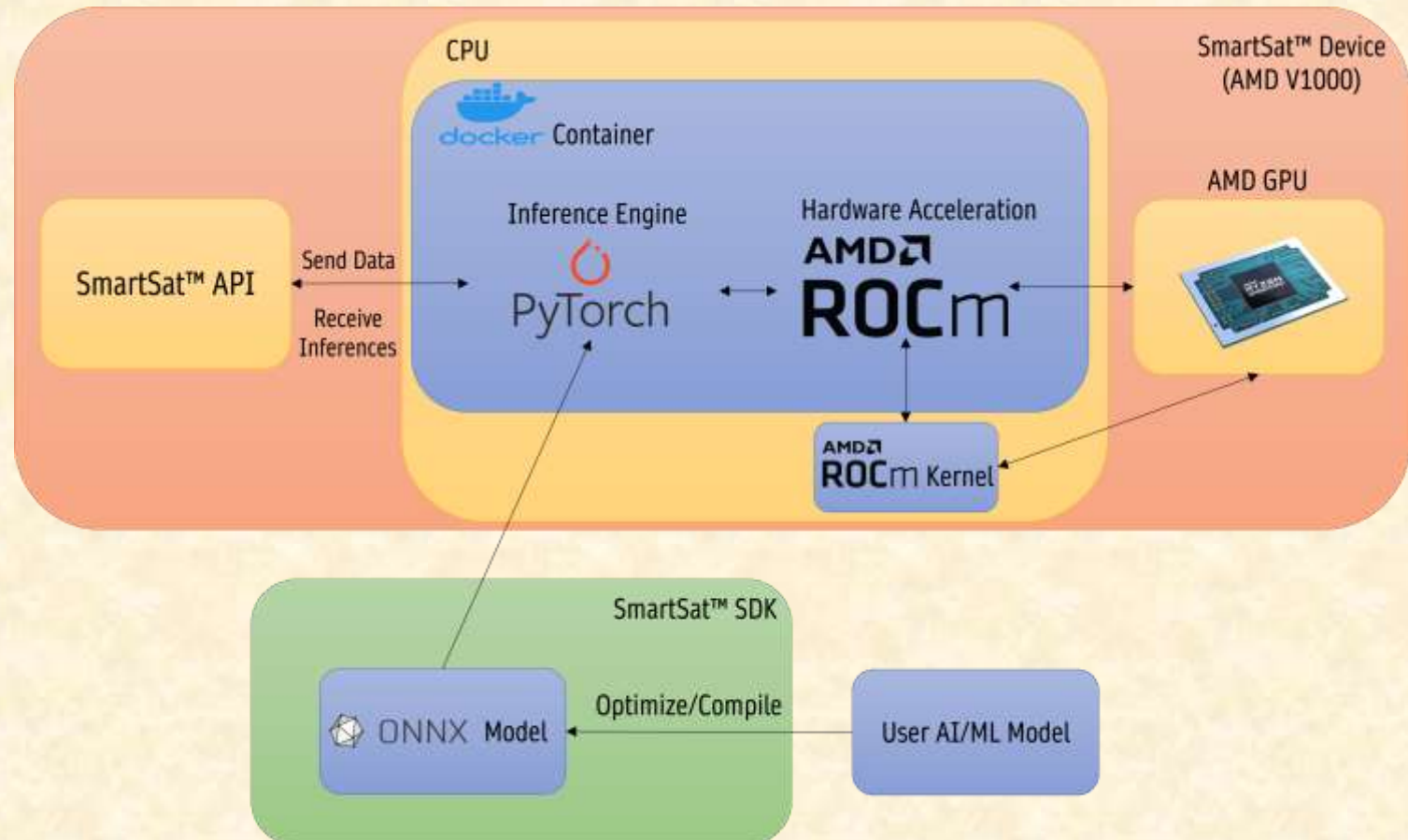
- SmartSat™ is an LMS software architecture that allows reprogramming satellites in orbit
- Our SDK Manager allows easy management of the installation of multiple SDKs
- View all relevant information about available SDKs
- Enabling hardware-accelerated inferencing on new low-power GPU architecture



System Architecture



System Architecture





SDK Manager – Published SDKs

The screenshot displays the Lockheed Martin Space SDK Manager interface. At the top, there are tabs for 'Published SDKs', 'Local SDKs', and 'Working SDKs'. Below the tabs, there is a search bar and a 'Refresh/Clear Filters' button. The main area shows a list of SDKs with columns for Name, Version, ISA, Board, CPU, Host OS, Target OS, and Export. Two SDKs are listed: 'smartsat-sdk-bionic-jetson-tx2-linux2022.10' and 'smartsat-sdk-bionic-jetson-tx2-linux2022.9.0'. Below the list, there is a detailed view of the selected SDK, showing its Name, Version, ISA, Board, CPU, Host OS, Target OS, and Export. At the bottom, there are filters for ISA, Board, CPU, Host OS, and Target OS, and a 'Clone to Local' button.

Published SDKs Local SDKs Working SDKs

Show 10 entries Search: Refresh/Clear Filters

Name	Version	ISA	Board	CPU	Host OS	Target OS	Export
<input type="checkbox"/>  smartsat-sdk-bionic-jetson-tx2-linux2022.10	10.00	ARMv7-A	jetson-tx2	x86-64	Debian	Ubuntu	0
<input checked="" type="checkbox"/>  smartsat-sdk-bionic-jetson-tx2-linux2022.9.0	9.00	ARMv7-A	jetson-tx2	x86-64	CentOS	Ubuntu	0

Name	Version	ISA	Board	CPU	Host OS	Target OS	Export
smartsat-dmcompiler-0.0.2	0.0.2	None	jetson-tx2	x86-64	RHEL	linux	None
smartsat-dmcompiler-doc-0.0.2	0.0.2	None	None	x86-64	RHEL	None	None

Showing 1 to 2 of 2 entries (filtered from 4 total entries) Previous 1 Next

Clone to Local



SDK Manager – Create SDK

Lockheed Martin Space - SDK Manager

Published SDKs Local SDKs Working SDKs

Show 10 entries

Refresh/Clear Filters

Search:

Export Classification

None

Licensing

None

Search Packages

Show 10 entries Search: smart

Name	Version	ISA	CPU	Board	Host OS	Target OS
<input type="checkbox"/> smartsat-sds-drivers-1.6.0	1.6.0	ARMv8-A	jetson-tx2	x86-64	RHEL	linux
<input checked="" type="checkbox"/> smartsat-sds-core-1.7.0	1.7.0	ARMv8-A	jetson-tx2	x86-64	Linux	linux
<input type="checkbox"/> smartsat-dmcompiler-0.0.2	0.0.2	None	jetson-tx2	x86-64	RHEL	linux

Showing 1 to 1 of 1 entries

Previous 1 Next

Uninstall Create New Publish



SDK Manager – User Preferences

The screenshot shows the 'SDK Manager - User Preferences' dialog box overlaid on the main SDK Manager interface. The dialog box contains the following fields and controls:

- Local SDK File Path:** A text input field containing 'C:\Users\rwfra\sdk_installs' and a 'Browse' button.
- API Key:** A text input field containing '4a1606fa-a37c-11ed-aa4e-b8ac6f87929b'.
- Server Address:** A text input field containing 'http://35.9.22.105:7624'.
- Author Name:** A text input field containing 'franc246'.
- Save:** A blue button at the bottom left of the dialog.

The background interface shows the 'Working SDKs' tab with a table of SDKs. The table has columns for 'Name', 'Version', and 'ISA'. One entry is visible: 'smartsat-sdk-bior' with a green plus icon. Below the table, it says 'Showing 1 to 1 of 1 entries'. To the right of the dialog, there is a search bar and a 'Refresh/Clear Filters' button.



Accelerated Inferencing in Container

```
root@55d1aa4d30bb: /home/workdir/ships
File Edit View Search Terminal Help
root@55d1aa4d30bb:/home/workdir/ships# python3 diagnostic.py
ROCm is available: True
ROCm device count: 1
ROCm device name: AMD Ryzen Embedded V1605B with Radeon Vega Gfx
root@55d1aa4d30bb:/home/workdir/ships# python3 ship_detector.py
Initializing model...
Model initialized. Press enter to continue.

Image filename: 0__20170617_180854_1031__-122.47157916689906_37.84433113894968.png
Predicted image class: Ship detected
Inference time: 0.0041599959999985

Image filename: 1__20170615_180728_1003__-122.32939830181054_37.73828964507481.png
Predicted image class: Ship detected
Inference time: 0.0033721279999952003

Image filename: 1__20170923_181241_0f42__-122.33247965400024_37.747770931971786.png
Predicted image class: Ship detected
Inference time: 0.0037999300000137737

Image filename: 1__20170106_180851_0e30__-122.33497426276108_37.75059713100036.png
Predicted image class: Ship detected
Inference time: 0.0038776459999780855

Image filename: 0__20170902_190521_0f53__-122.278891898327_37.76416552788649.png
Predicted image class: Ship not detected
Inference time: 0.003842139999989058

Image filename: 0__20170902_190520_0f53__-122.10334951658139_37.74419553117477.png
Predicted image class: Ship detected
Inference time: 0.004042776000005688

Image filename: 1__20170414_180529_0f28__-122.35735977825489_37.76889177756483.png
Predicted image class: Ship detected
Inference time: 0.00488318300000401

Image filename: 1__20170615_181426_0e0d__-122.32926235929204_37.738261832150734.png
Predicted image class: Ship detected
Inference time: 0.0035839249999867206

Image filename: 0__20170609_180756_103a__-122.34118952546713_37.74863112136516.png
Predicted image class: Ship detected
Inference time: 0.0038393839999741886

Average inferencing time: 0.003933456444438359
```



What's left to do?

- Features
- Stretch Goals
 - Automatic system dependency resolution
 - Continue attempting to build ONNX Runtime with ROCm execution provider
- Other Tasks
 - Refine command line outputs
 - Deploy modified inference engine as SmartSat app



Questions?

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