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Product Deep Dive Presented by New Eagle

Raptor in the Cloud

Raptor = Go Fast

Raptor is famous for its “single button build” workflow

New Eagle has expanded the capabilities of Raptor dramatically in recent years, without violating this fundamental concept

- Raptor-Dev supports all New Eagle ECUs, enabling executable generation through a single button build process
- Raptor-Safe is seamlessly integrated within Raptor-Dev to produce detailed stack, timing, and code quality analysis results alongside the single button build process

New Eagle will bring this same spirit to ECU virtualization beginning with Raptor 2025b

- Single block added to Raptor model to configure the attributes of the virtual ECU

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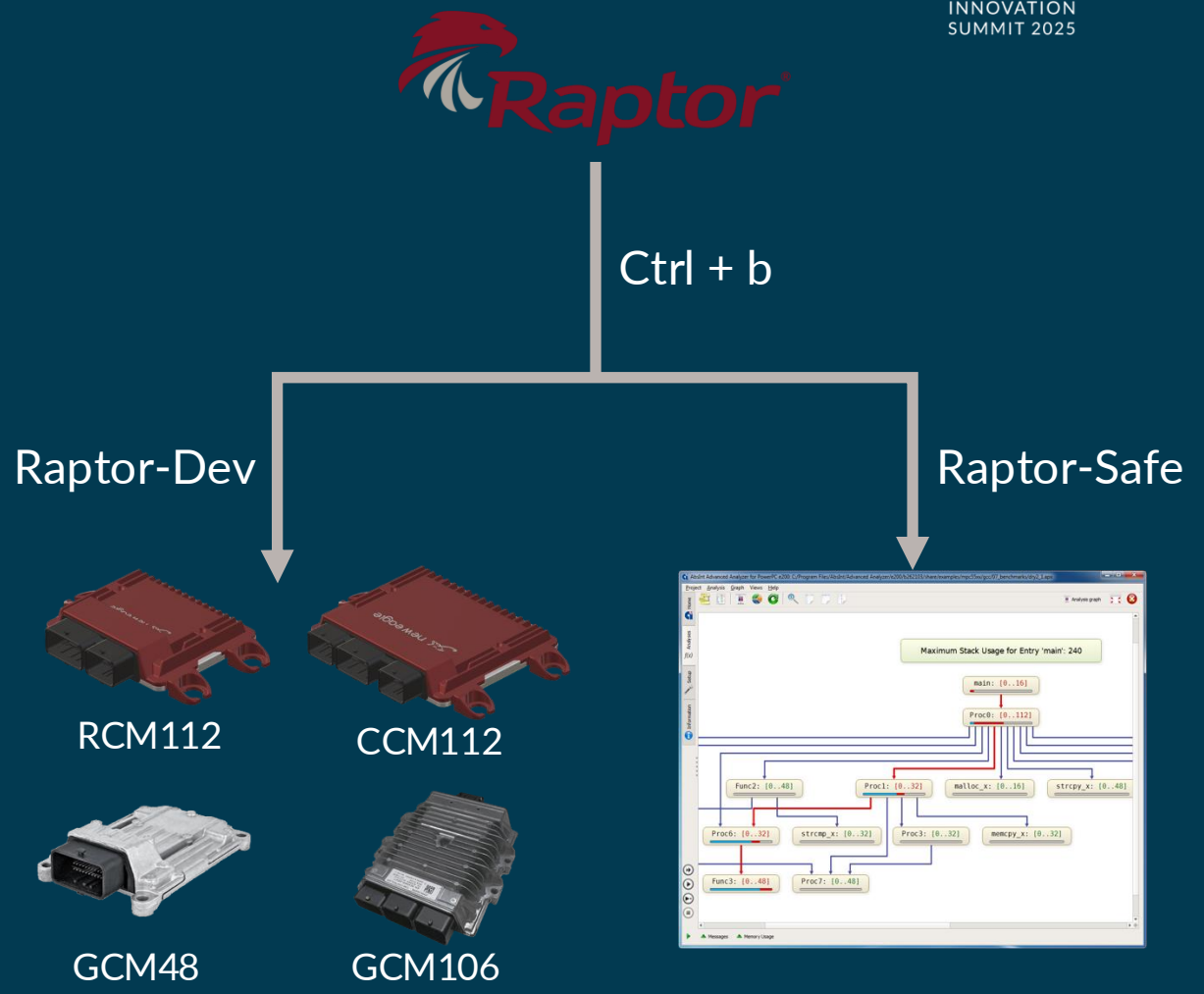

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Reliance On Physical Hardware Is A Risk

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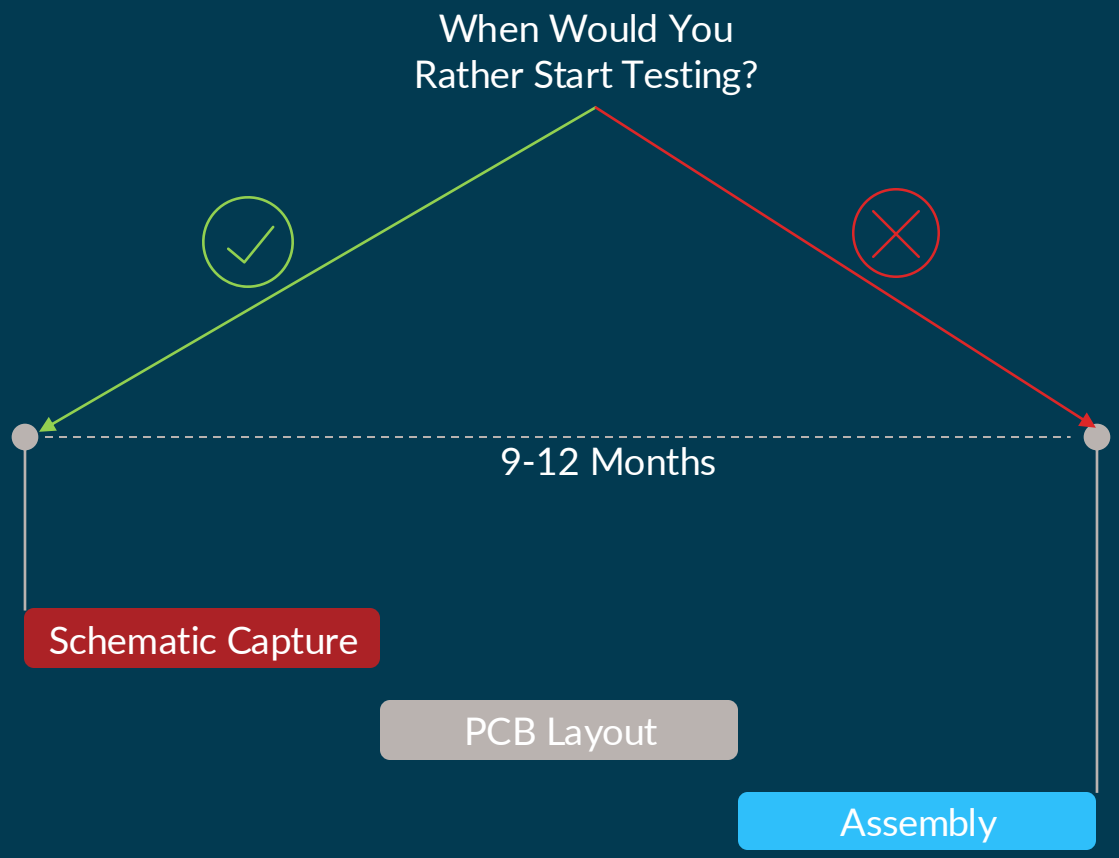
Delays from manufacturing or limited access to physical hardware delay software development

Application software through base software could be fully developed and tested before availability of the sample hardware

- All such software is MCU independent by nature
- Includes the operating system and communication stack configurations

If a method existed to virtualize the application and base software flexibly, it would unlock numerous avenues to accelerate program timing

- Test the application alongside a plant in a virtual environment
- Perform integration testing between multiple virtual ECUs
- Perform regression testing unbound by physical test infrastructure



How Do We Virtualize ECUs

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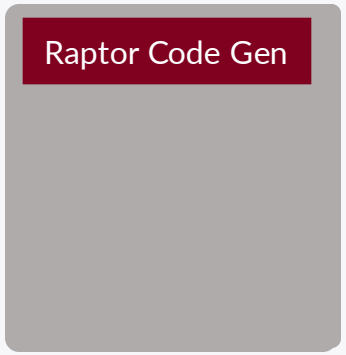
Our Immediate Focus

Level 1 vECU

Integrates ASW only with signal level communication

- Enables quick application development & iteration
- Supports virtual HIL workflow

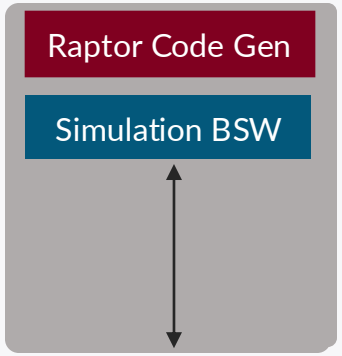


Signal Level Communication

Level 2 vECU

Integrates ASW with simulated BSW

- Enables realistic network integration of multiple vECUs
- Supports virtual integration testing very early in project

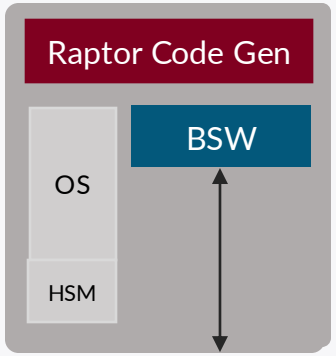


Signal + Bus Level Communication

Level 3 vECU

Integrates ASW with production BSW

- Enables full simulation of everything north of the MCAL
- Supports full integration testing of ASW + BSW before hardware

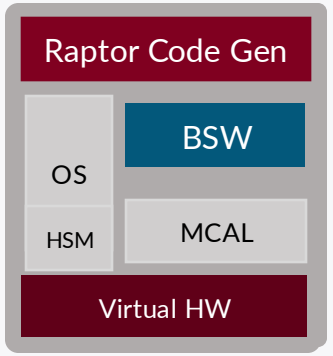


Bus Level Communication

Level 4 vECU

Integrates ASW with production BSW and true hardware simulator

- Simulates execution of full production software stack on a virtual representation of the hardware



Bus Level Communication

Raptor Cloud: A Complete Toolchain Enabling Virtualization

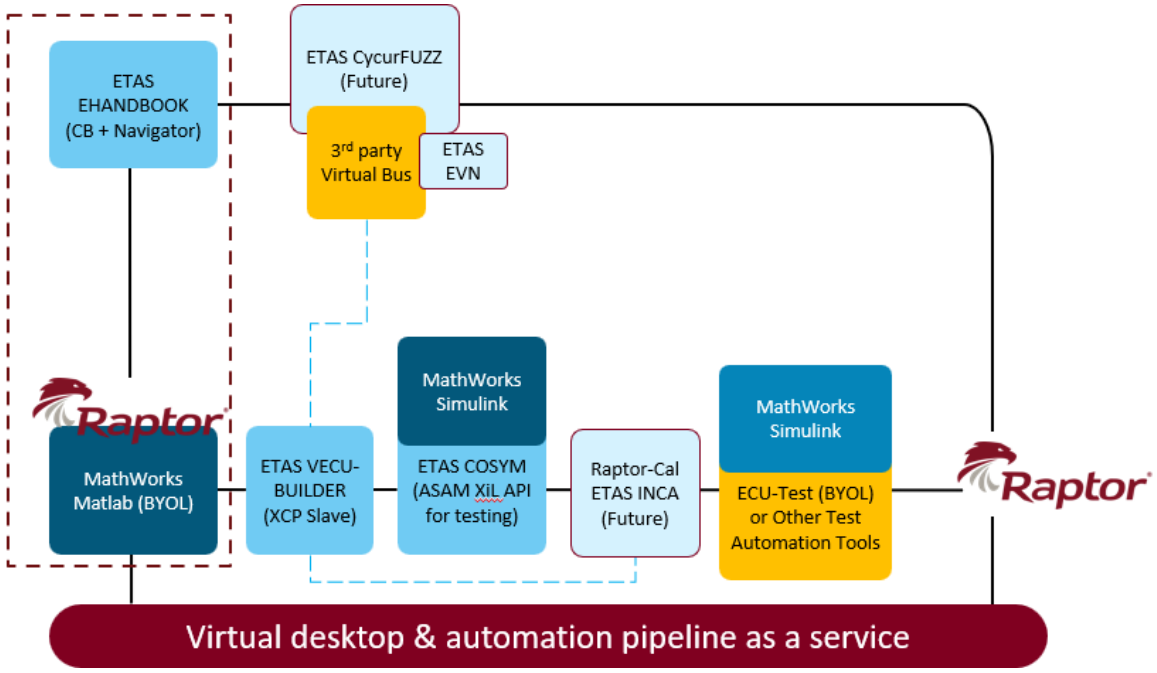
Initial Support in Raptor 2025b

Raptor Cloud tooling streamlines your development workflow throughout “the V”

Built around a core set of tooling developed by ETAS and available through New Eagle for use within a cloud-based workflow

- Develop your code in Raptor, Matlab/Simulink, ASCET, or C
- Create virtual ECUs of varying fidelity to exercise your software in new ways, even before hardware is available
- Automatically generate living documentation leveraging ETAS eHANDBOOK
- Support multiple workflows with a common set of tooling: Virtual HIL, Virtual Integration Testing, and CI/CD Pipelines.

Combining Raptor Cloud with Raptor-Dev unlocks the ability to create virtual ECUs directly from Raptor with “single button build” efficiency



Raptor Virtualization Toolbox

Raptor Virtual Target

Create New Eagle virtual ECUs by adding a single block to your model

Initial support will be for Level 2 vECUs featuring:

- CAN, ETH, and LIN Virtualization
- I/O Virtualization
- XCP Calibration
- ATS/Soft Real Time Simulation

Initially supported for RCM112 and GCM106 targets

- Support for additional targets will be continuously added
- Future updates will include support for Level 3 vECUs

Available from Raptor 2025b!

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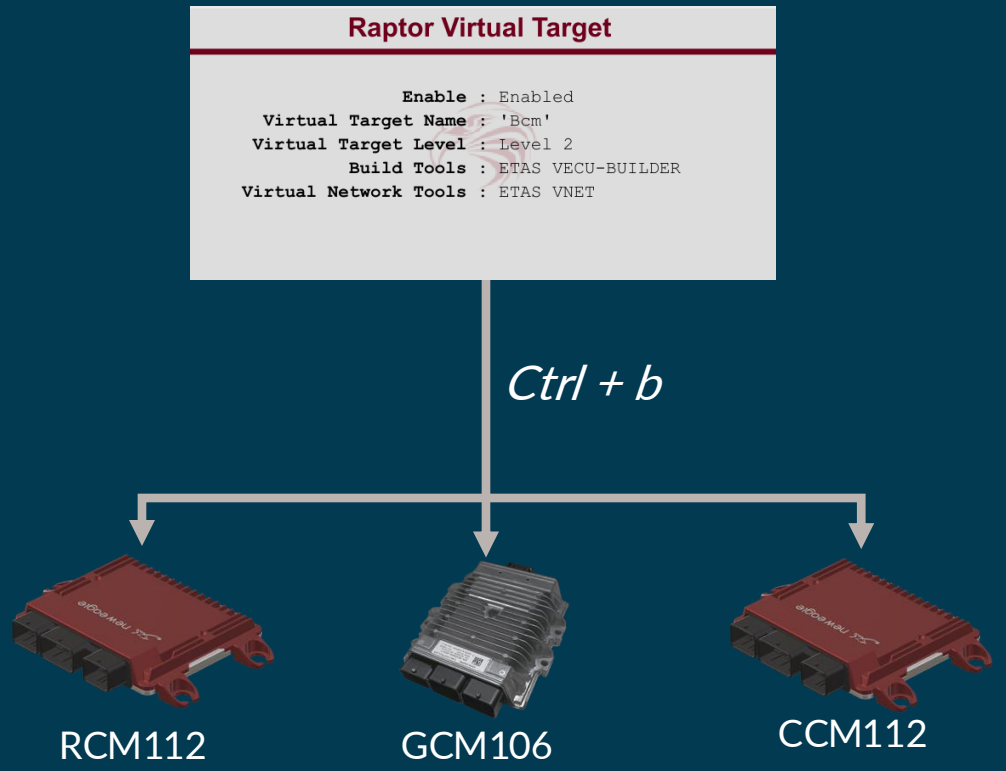
A Single Block In Your Raptor Model



Virtualized Automotive Networks

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ETAS Virtual Network (vNET)

CAN

Simulate high-speed CAN and CAN-FD networks

- Support for CAN and CAN-FD
- Extended and standard CAN frames
- Bus arbitration based on frame IDs
- Configurable baud rates

LIN

Simulate Master and Slave nodes in complex LIN networks

- Supports typical baud rates
- Supports Master/Slave mode
- Standard LIN frame sizes

Ethernet

Simulate high bandwidth Automotive Ethernet networks

- Standard Ethernet frames with standard headers
- VLAN header extension with VLAN ID, priority
- Supports multiple Ethernet networks, with multiple network nodes, with unique MAC addresses

Additional Features

Expand testing capabilities beyond data logs

- Restbus Simulation via common formats such as DBC files
- Define custom C Code for Restbus module behavior
- Connectivity to ETAS INCA
- Self-reception capable (loop-back)

Day-2 Preview: Raptor Virtual Target

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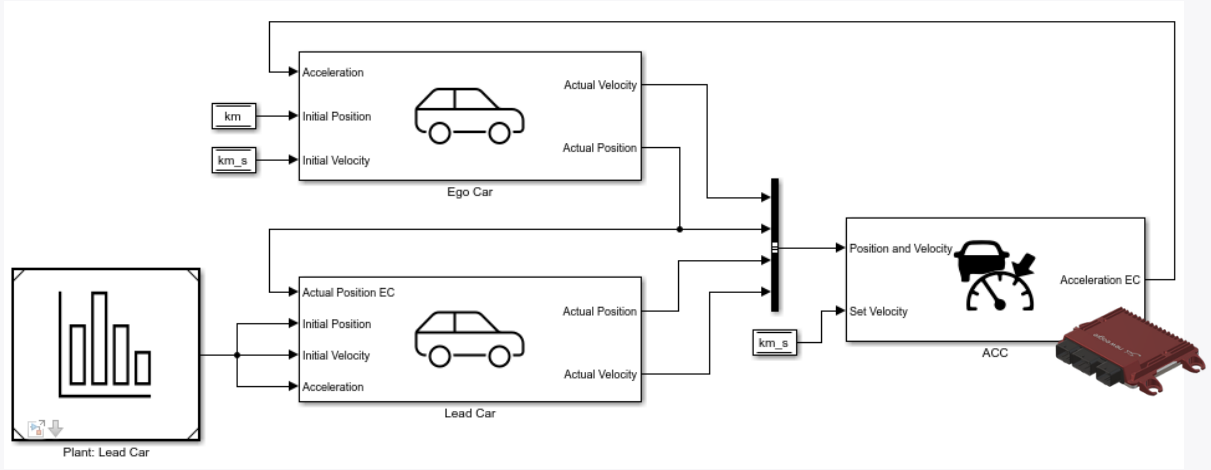
Simulation-Driven Engineering: Faster Iterations, Smarter Development

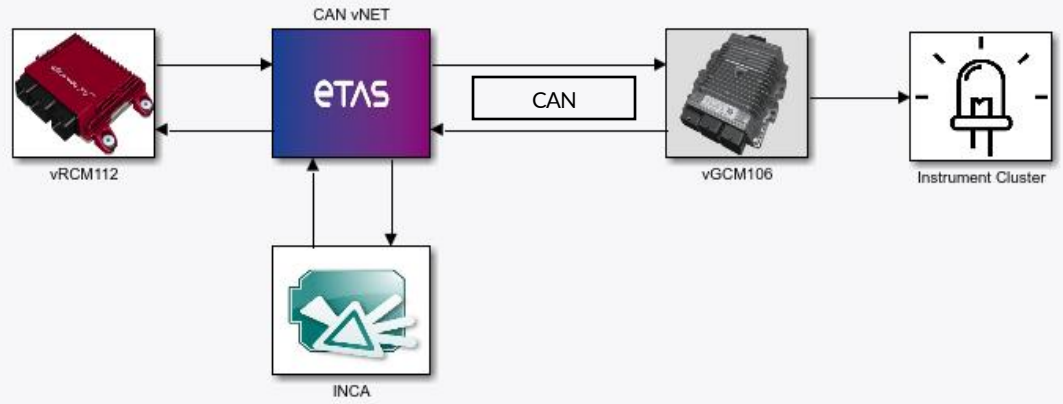
Real use-case of Adaptive Cruise Control application

- Validate controller behavior with Ego and Lead Car Simulation
- Validate correctness of ECU-specific network configurations

Body Control Module communicating over a network with VCU

- vRCM112 and vGCM106 in CAN Virtual Network
- Actuation of virtual I/O





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Raptor-Cloud

Virtual Network Integration Testing

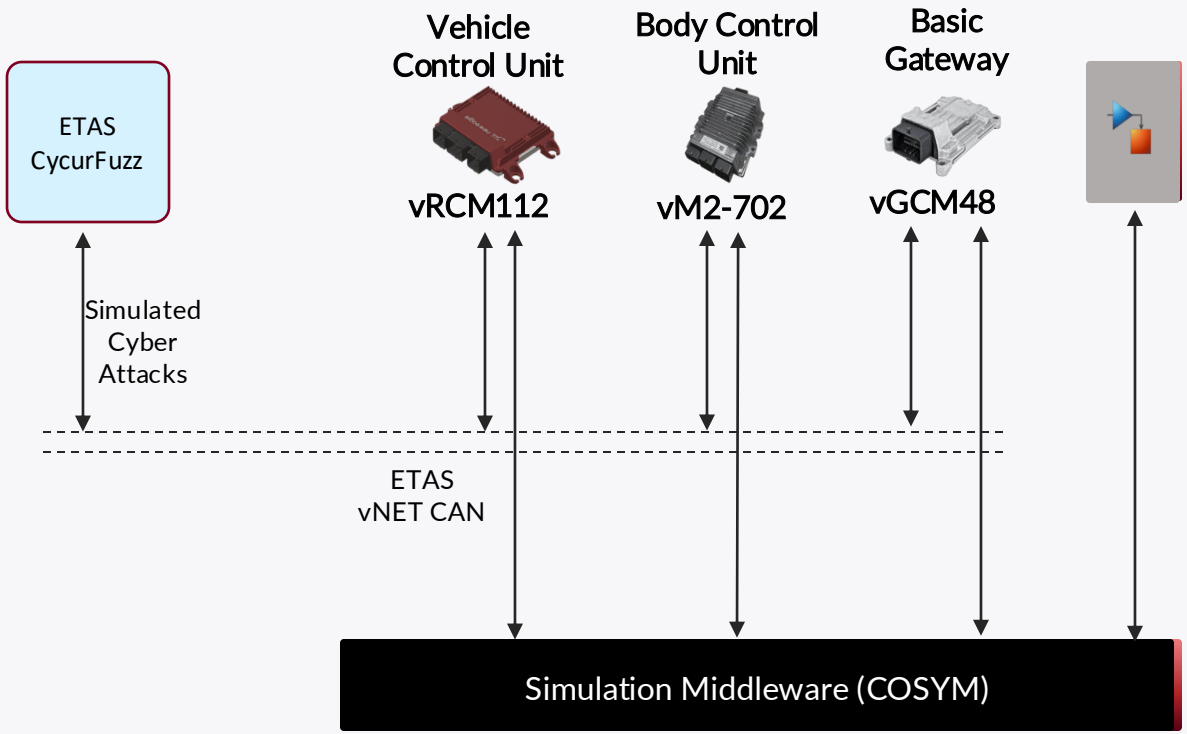
Identify network integration issues months in advance of vehicle availability

Virtually network numerous vECUs together, including those that may come directly from a supplier

- Identify integration issues ranging from network timing errors to data formatting errors
- Optionally include plant models for key portions of the application

Extend the testing to include protocol stacks such as UDS and J1939

- Optionally perform cybersecurity penetration testing in the virtual environment to detect weaknesses before going to hardware



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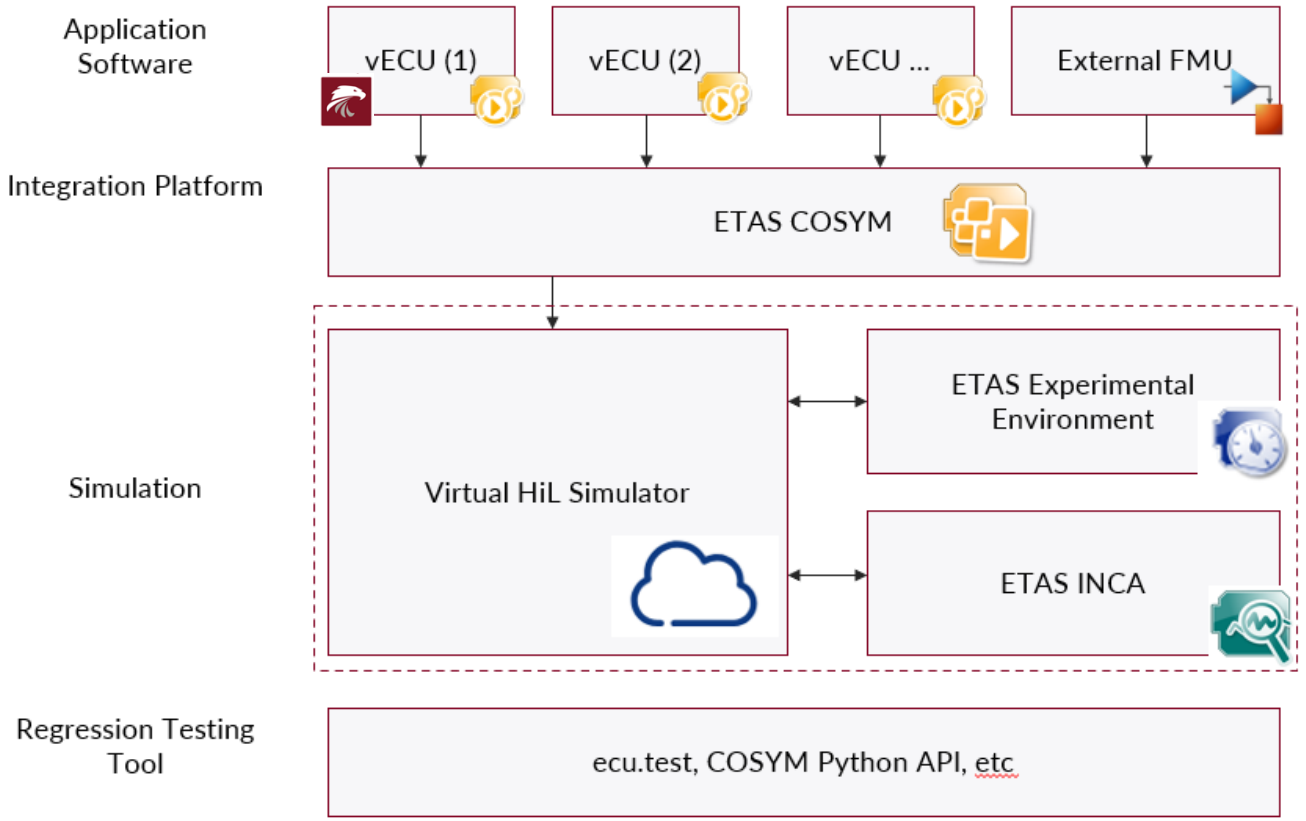
Realization of Raptor ECU Virtualization Toolbox

Versatile ETAS software platform, easily accessible through “single-button build” workflow

Integrate existing applications into virtual workflow

- Simulation of complex vehicle networks
- Open platform for integration of controllers and plant models
- Flexible automated workflows



Turnkey CI/CD Pipeline

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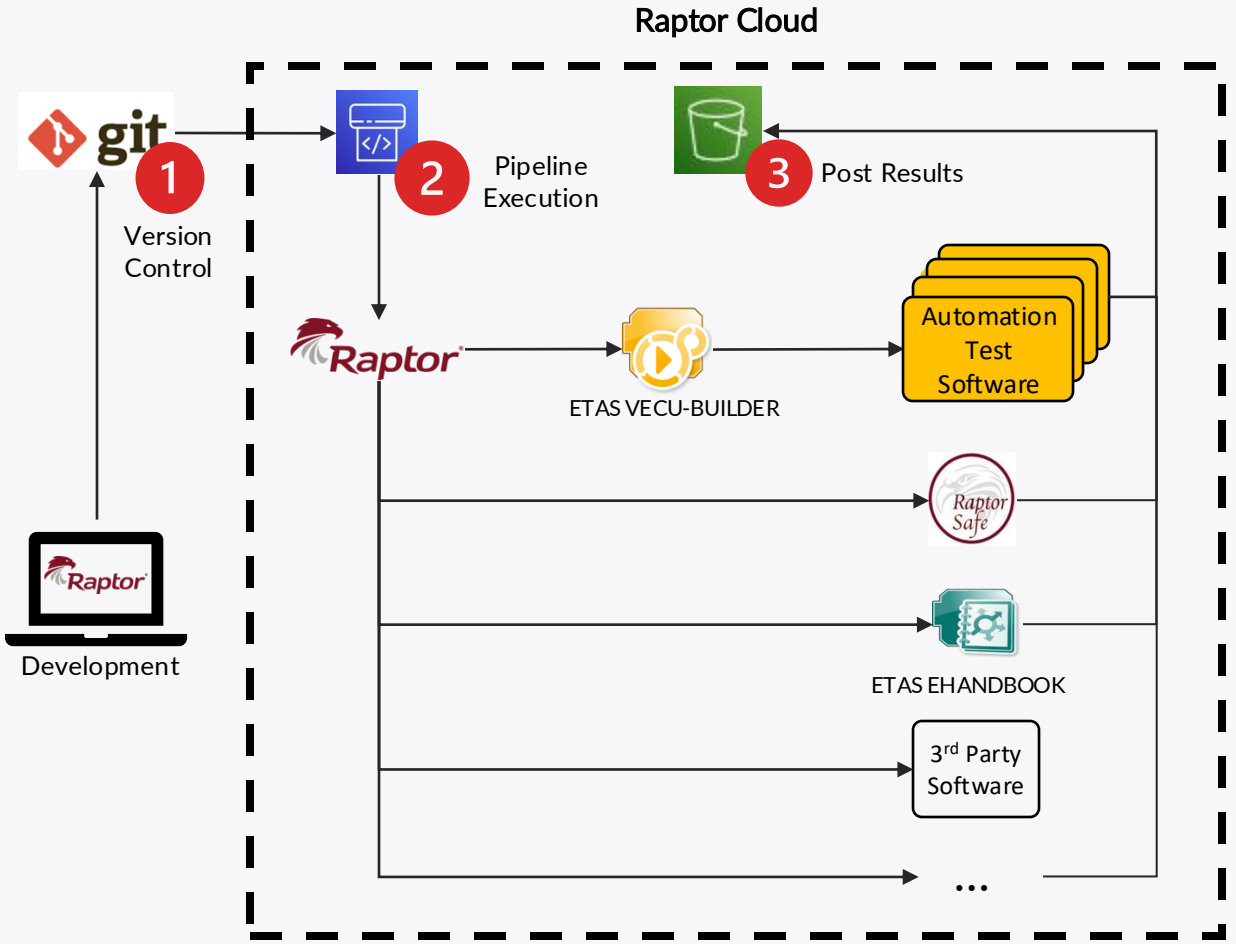
Raptor Cloud can build, test, and analyze your software, allowing you to focus on results

Process can be triggered from activity in your existing GIT repository

- Raptor-Dev will build and virtualization your ECU(s) in preparation for testing
- Pipeline is flexible to support third-party test tools that may already be in place
- Raptor-Safe will analyze your source code, stack consumption, and execution time
- You have the confidence in knowing your changes passed rigorous testing and analysis w/o expending effort

The pipeline structure is flexible to incorporate with a wide range of third-party products you may already be using



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Shift V-Cycle Development Left

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Reduce risk from delays in BSW and HW development

- Shift project timelines left performing integration/system testing virtually
- Continuous Integration workflows increase confidence in software integrity before Base Software or Hardware are available