# vTAG

The vTAG simulation environment forms part of the integrated data analysis systems provided by McLaren Electronic Systems Ltd.

vTAG provides the framework to support the execution of model based embedded code on PC based hardware. The entire system application code can be auto-generated from models developed with tools such as Simulink and Dymola.

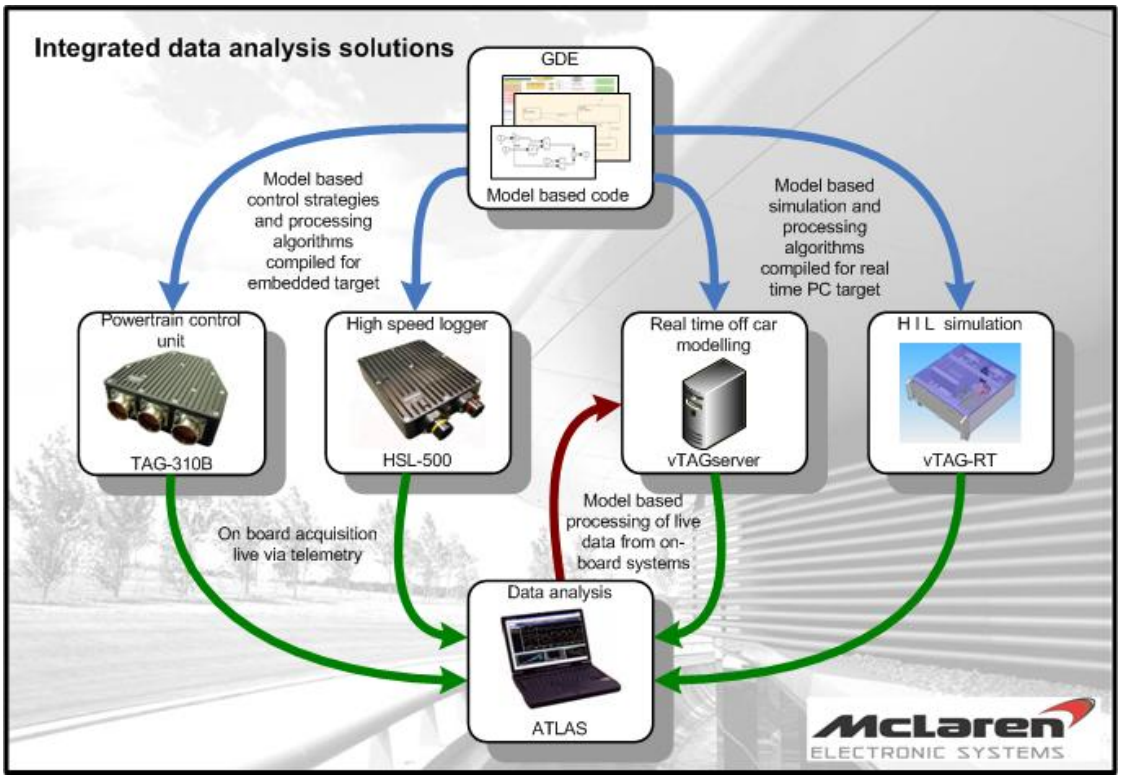
vTAG applications can be used in the vTAGserver environment to analyse and enrich the data received from embedded control units.
In the vTAG-310 environment entire systems can be modelled allowing Software-In-The-Loop (SIL) development of control systems
In the vTAG-RT environment vTAG applcations are run in hard realtime allowing creation of Hard-In-The-Loop (HIL) test equipment and vehicle simulators.

**Features**

- Simulation and code generation environment
- Configuration of system using System Monitor
- Logging of data using Atlas
- Integration with Atlas client allowing processing of existing data
- Integration with Atlas DataServer allowing enrichment of telemetry data stream to clients
- Multithreading system allows utilisation of multi-core processors

**Environments**

- vTAGserver – Offline processing of logged data. Real-time processing of live telemetry data
- vTAG-310 – Windows PC based simulation of entire systems
- vTAG-RT – PC hardware running RTOS for hard realtime simulation



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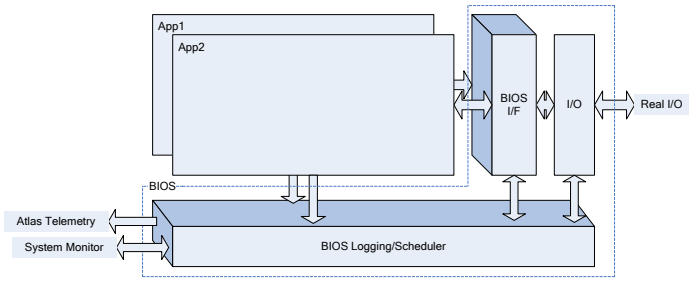
## System Architecture

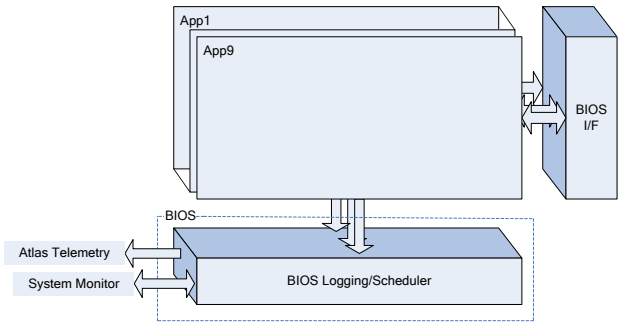
The vTAG system provides an environment which is very similar to that in the real ECUs provided by McLaren Electronic Systems.

The real ECUs incorporate a BIOS which controls the unit's I/O, logging, scheduling and communications and, depending on the ECU, support up to 3 applications. Parameters are passed between the BIOS and the applications via the BIOS interface.




Real ECU

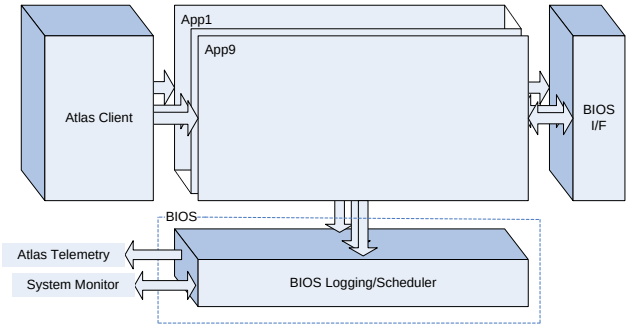
In vTAG-310, the I/O layer is removed and support for up to 9 applications is provided. Typically the additional applications would be used for plant models (eg engine or car simulation) which will be able to exchange I/O parameters via the BIOS interface.




vTAG-310

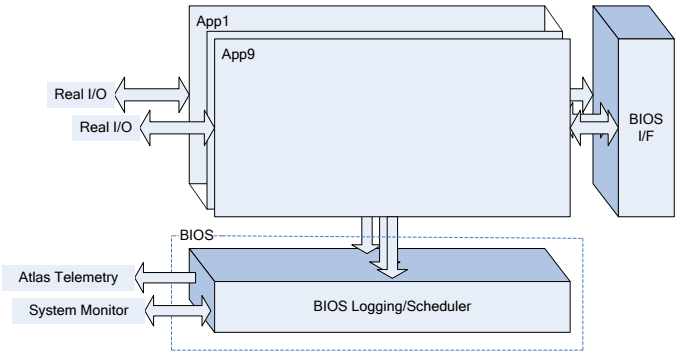
The task scheduling can be set to run at normal speed (within the constraints of a Windows system).

In vTAGserver, data for the applications is sourced from Atlas using Simulink blocks from the GDE toolbox. The vTAG simulation can be run within Atlas by the user and the resulting logged data written to disk by the Atlas client. Alternatively, the vTAG simulation can be run automatically when live data is available and the results sent via Ethernet telemetry to an Atlas DataServer running the vTAGserver recorder. vTAG data will then be sent by the DataServer to all clients along with the original data stream. This allows data from vTAGserver to appear as if it had come from the live data source.




vTAGserver

vTAG-RT provides an environment similar to vTAG-310, except that the PC hardware used is dedicated to the task and runs the OnTime RTOS-32 realtime operating system. This is the same RTOS which is used by The MathWorks for their xPC product and so it is possible to use xPC I/O board drivers under vTAG-RT allowing a wide variety of interface cards to be used. The operating system provides hard realtime execution. Additionally, execution may be synchronised to an external source allowing multiple vTAG-RT systems to run in sync, or a vTAG-RT to be synchronised to a connected ECU.




vTAG-RT



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McLaren ELECTRONIC SYSTEMS

# vTAG

### vTAG Kernel

The vTAG Kernel provides the core executable for the system. It provides the equivalent of an embedded system's boot code, and provides basic Ethernet communications for connecting to System Monitor. The vTAG kernel runs inside the vTAG-310 Windows application, or within the Atlas vTAGserver In-place control. In vTAG-RT the kernel runs directly on the target system under the RTOS.

### vTAG BIOS

The vTAG BIOS provides all the communication, task scheduling and logging for the system. Up to 9 vTAG applications may be run by the BIOS. To take advantage of PCs with multiple processor cores the BIOS allows each application to run in a separate thread.
Logging at rates up to 1kHz is provided. The signals to be logged are selected using System Monitor and may be logged at different rates in each of 8 channels. Channel start/stop triggers can be configured individually allowing complex event based multirate logging of signals.

### vTAG Applications

vTAG applications can be built from Simulink models using GDE 8.1 with the vTAG Platform Support Package. This allows Simluink models to be built into code that is tailored to running on the vTAG system. Other platform support packages are available to allow code to be built for real ECUs. The same models can be used on either vTAG or real ECUs with minimal changes.
To build applications using Dymola the Dynamic Model Integrator (DMI) is used and is capable of using Dymola's code export or binary export capabilities

### Interapplication Communications

vTAG applications can communicate with each other by several methods:
Shared Memory – several shared memory areas can be defined to allow applications to read/write from common predefined areas.
External Reference – Using GDE 8.1's Measurement Read blocks implicit connectivity can be achieved. At initialisation for any signal Measurement Read block which does not have a corresponding write block in that application, the BIOS will search the other applications for that signal and use it if found.

### Development Products

For Simulink vTAG-310/vTAGserver applications
- GDE 8.1
- vTAG Platform Support Package

For Dymola vTAG-310/vTAGserver applications
- Dynamic Model Integrator (DMI)
- Visual C++ Express (2005/2008)

For vTAG-RT applications the vTAG-RT extension must be specificed in addition. If DMI and GDE are used on a single PC, then only one vTAG-RT extension is required for both.

### Runtime Products

For vTAG-310
- System Monitor
- Atlas
- vTAG-310

For vTAGserver (local client processing only)
- System Monitor
- Atlas
- vTAGserver

For vTAGserver (live data processing)
- System Monitor
- Atlas
- vTAGserver
- Atlas DataServer
- Atlas VTS recorder

For vTAG-RT
- System Monitor



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