

INTO THE ROS

ADVANCED ROS NETWORK INTROSPECTION

Praxis der Softwareentwicklung
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S o f t w a r e d e s i g n



Client

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1 Composition

1.1 Architecture

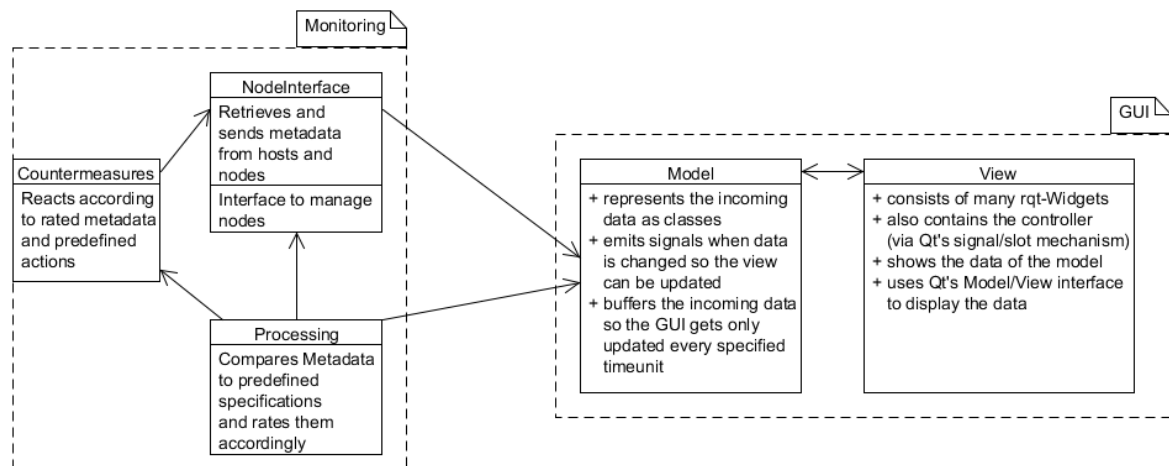


Abbildung 1.1: architecture

Figure 1.1 shows the general architecture of our software. It is divided into two parts, one for the graphical user interface and one for the monitoring aspect. The right part depicts the GUI. It is designed using the MVC architecture, consisting of the usual three elements: model, view and controller. It will handle user-interaction. The left part depicts the monitoring aspect. It consists of three elements : NodeInterface, Countermeasure and Processing. It will take care of collecting metadata, processing it and taking appropriate action in case of an error.

1.1.1 Monitoring

NodeInterface

- Retrieves and sends metadata from hosts and nodes
- Interface to manage nodes

Processing Compares Metadata to predefined specifications and rates the accordingly

Countermeasures Reacts according to rated metadata and predefined actions

1.1.2 GUI

Model

- Represents the incoming data as classes
- Emits signals when data is changed so the view can be updated
- Buffers the incoming data so the GUI gets only updated every specified timeunit

View

- Consists of many rqt-Widgets
- Also contains the controller (via Qt's signal/slot mechanism)
- Shows the data of the model
- Uses Qt's Model/View interface to display the data

2 Classes Description

2.1 Processing

2.1.1 MonitoringNode

Main Class wrapping the processing functionality.

2.1.2 Metadata

Wraps metadata of exactly one host or node, a topic or a node-topic-combination

2.1.3 MetadataTuple

Contains the name of a metadata field and an object which can be a monitoring point or the bounds as a tuple.

2.1.4 MetaDataStorage

Saves recieved metadata packages for a given period of time and can provide them on request.

2.1.5 Specification

Wraps specification fields. Can contain multiple MetadataTuple objects from exactly one host or node

2.1.6 SpecificationHandler

Loads the specifications from the parameter server and compares them to the actual metadata.

2.1.7 ComparisonResult

Wraps the result of the comparison between the actual metadata and the specifcaton.

2.2 NodesInterface

2.2.1 HostStatistic

Singleton per host which contains statistics about the host and nodes running on the it. Handles request regarding node management.

2.2.2 NodeManager

Is able to stop or restart nodes.

2.3 Countermeasures

2.3.1 CountermeasureNode

Handles incoming information about malfunctioning nodes and reacts according to defined countermeasures.

2.4 GUI

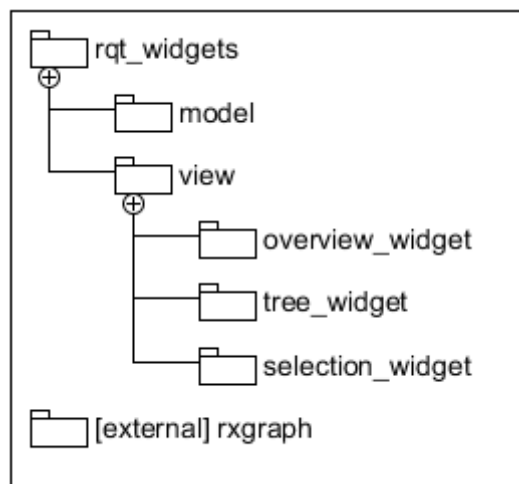


Abbildung 2.1: The package structure of the GUI

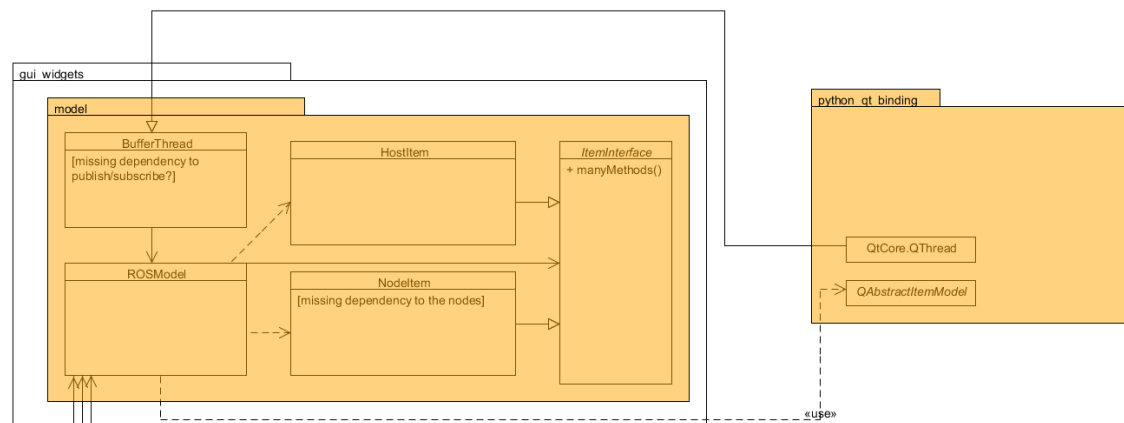


Abbildung 2.2: The model class diagram

2.4.1 Model

BufferThread

This thread should buffer the incoming data and regularly update the model and hence also the view.

ROSModel

Represents the data as a QtModel. This enables automated updates of the View.

ItemInterface

Provides a unified interface to access the items of a model.

HostItem

A HostItem represents a host with all its data.

NodeItem

A NodeItem represents a node with all of its data. It also has a interface to start/stop/restart nodes.

2.4.2 View

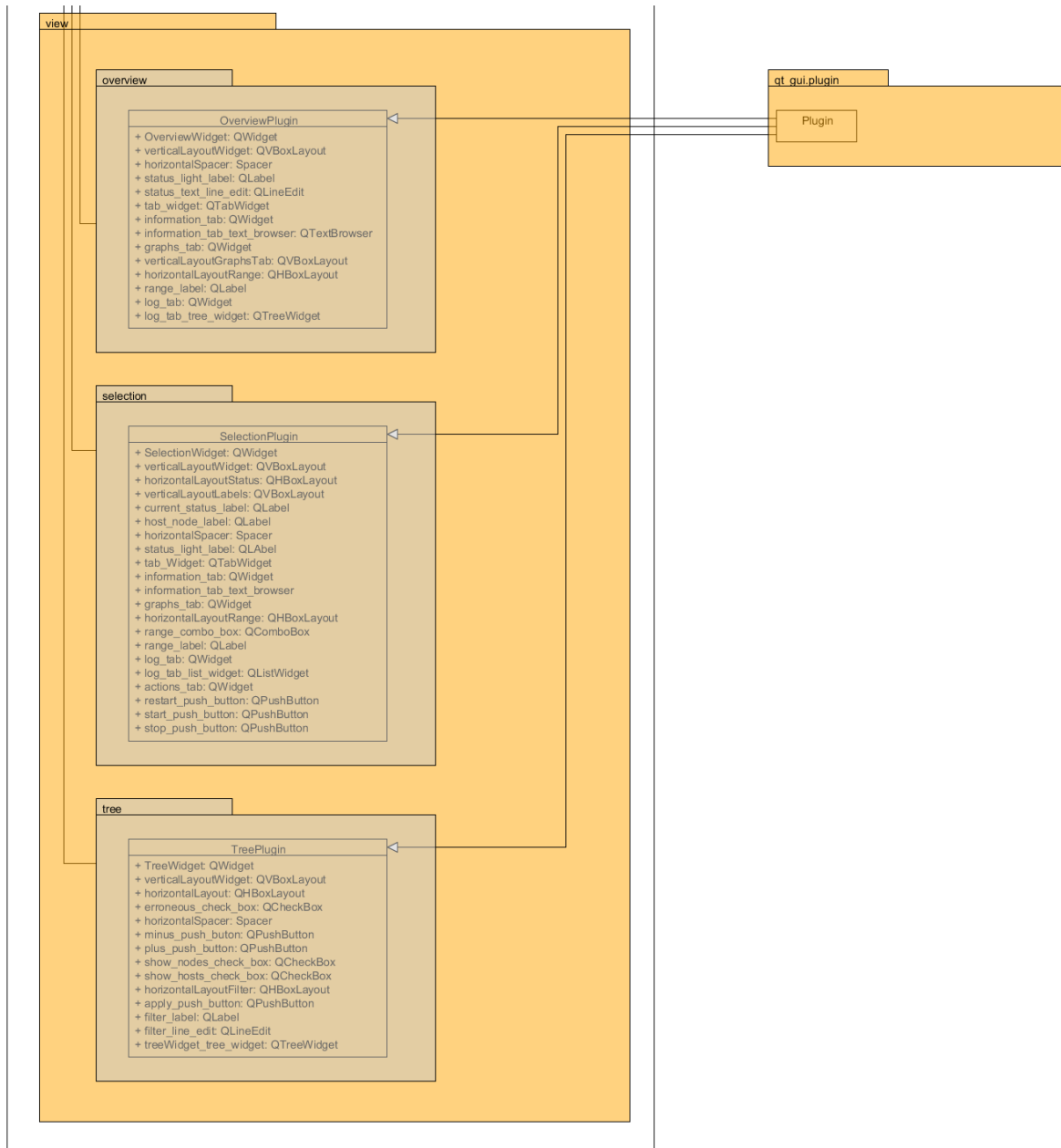


Abbildung 2.3: The view class diagram

OverviewPlugin

The class OverviewPlugin is the core of the graphical user interface, which contains most of the relevant information in a small and fancy area.

TreePlugin

The class TreePlugin is very simply and shows only the actual active hosts and nodes.

SelectionPlugin

The class SelectionPlugin shows detailed information about the currently selected host or node.