ATExplorer 1.0 - User Manual

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Preface

ATExplorer integrates a number of software components that are useful in the context of *Array Tomography (AT).*

.. AT intro here..

The following software components are the main building blocks that ATExplorer is built on top of:

- RENDER PYTHON by F Collman et al. RenderPython is a thin Python wrapper for *Render*.
- RENDER by ??? et.al
- FIJI by et. al....
- DOCKER et. al.

In addition to the above, semi specialized software packages, a number of open source, C++, libraries are employed by the ATExplorer application:

- VTK by
- POCO by ??? et.al
- LIBCURL by et. al....
- TINYXML2 et. al.
- DUNE SCIENTIFIC LIBRARY (DSL) et. al.

The ATExplorer application was designed and implemented in the lab. of Stephen J Smith and

Forrest Collman, at the Allen Institute of Brain Science by Totte Karlsson.

The following people has been contributing to the effort; .....

Part One

1. Overview of the ATExplorer UI and API

1.1 Introduction

This chapter gives an overview of the software that is named *ATExplorer*.

The following section discusses the application in greater detail.

The ATExplorer was designed and implemented due to an emerging need to allow non-programmers to process, manage and explorer Array Tomography data on a routine basis.

Depending on the actual protocols, an Array Tomography data set can range in size from pretty small, a few hundred megabytes, to very large, like several Terra bytes and depending on number of stains and sessions, the complexity of the data-sets range from trivial to complex.

The main challenge in Array Tomography is the precise reconstruction of an original volume, from individually cut and imaged slices of tissue of the same.

.. even before volume reconstruction can begin various pre data processing algorithms may need to be applied, such as median filtering, flatfield correction and de-convolution.

These processing algorithms are all, to some extent, complex. ATExplorer attempts to provide the non-programmer user with intuitive and easy to use UI components to guide the through the process in order to get to data that are useful for scientific discoveries and exploration.

1.2 The ATExplorer UI

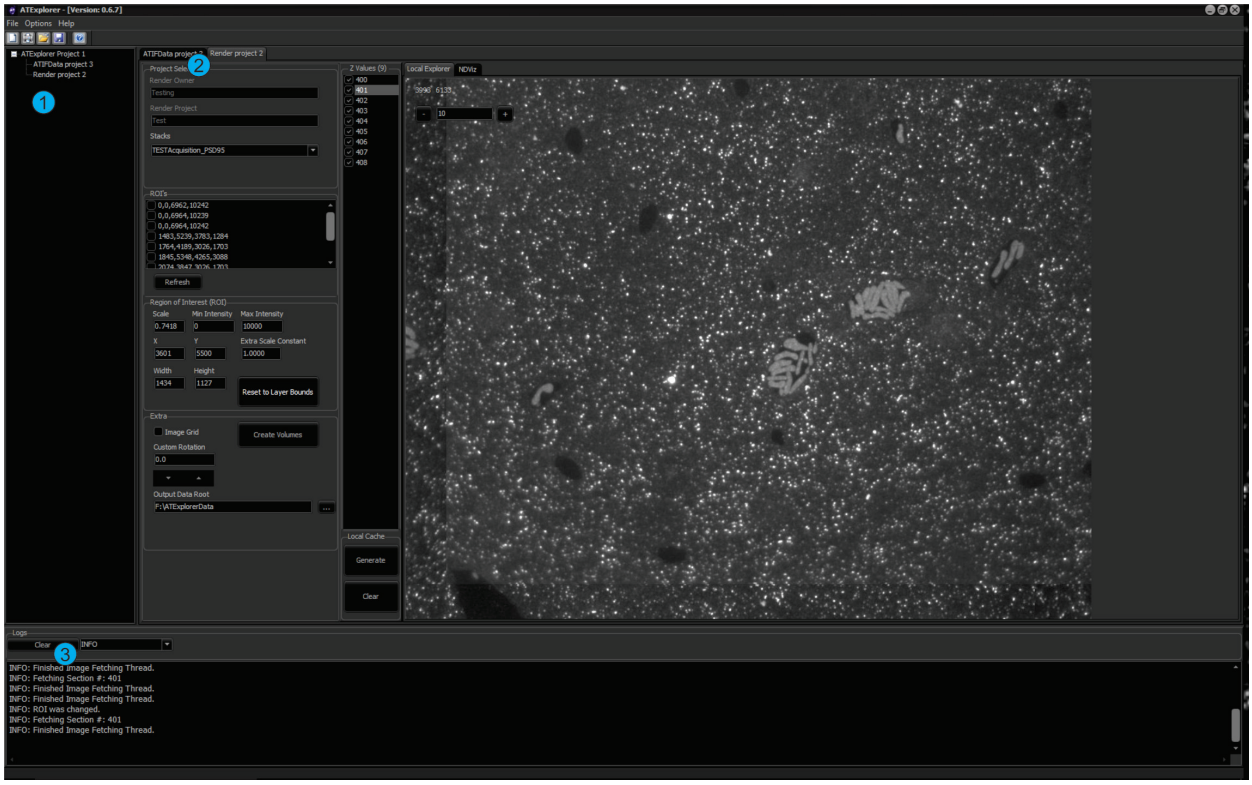


Figure 1.1: ATExplorer UI. The circled numbers in the figure indicate relevant elements of the UI; ① Project(s) TreeView. ② Tabbed Project Item View. ③ Information and Application Log Messages.

1.2.1 Importing Data

- IMPORTING PROCESS Give an overview on what happens when data is being imported to ATExplorer .
- DATA FORMATS Describe the Allen Institute format, and Kristinas format.

1.2.2 Processing Data

- MEDIAN CALCULATION
- FLATFIELD CORRECTION
- DECONVOLUTION
- STITCHING
- REGISTRATION
- ROUGH ALIGNING
- FINE ALIGNING

• OTHER

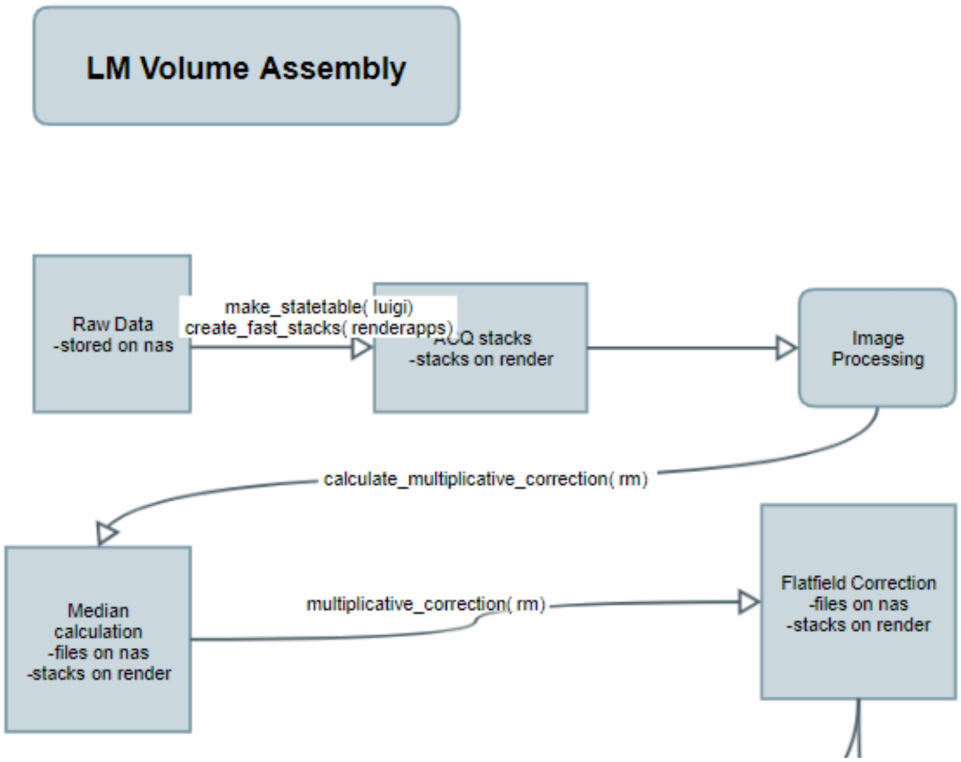


Figure 1.2: Processing .....

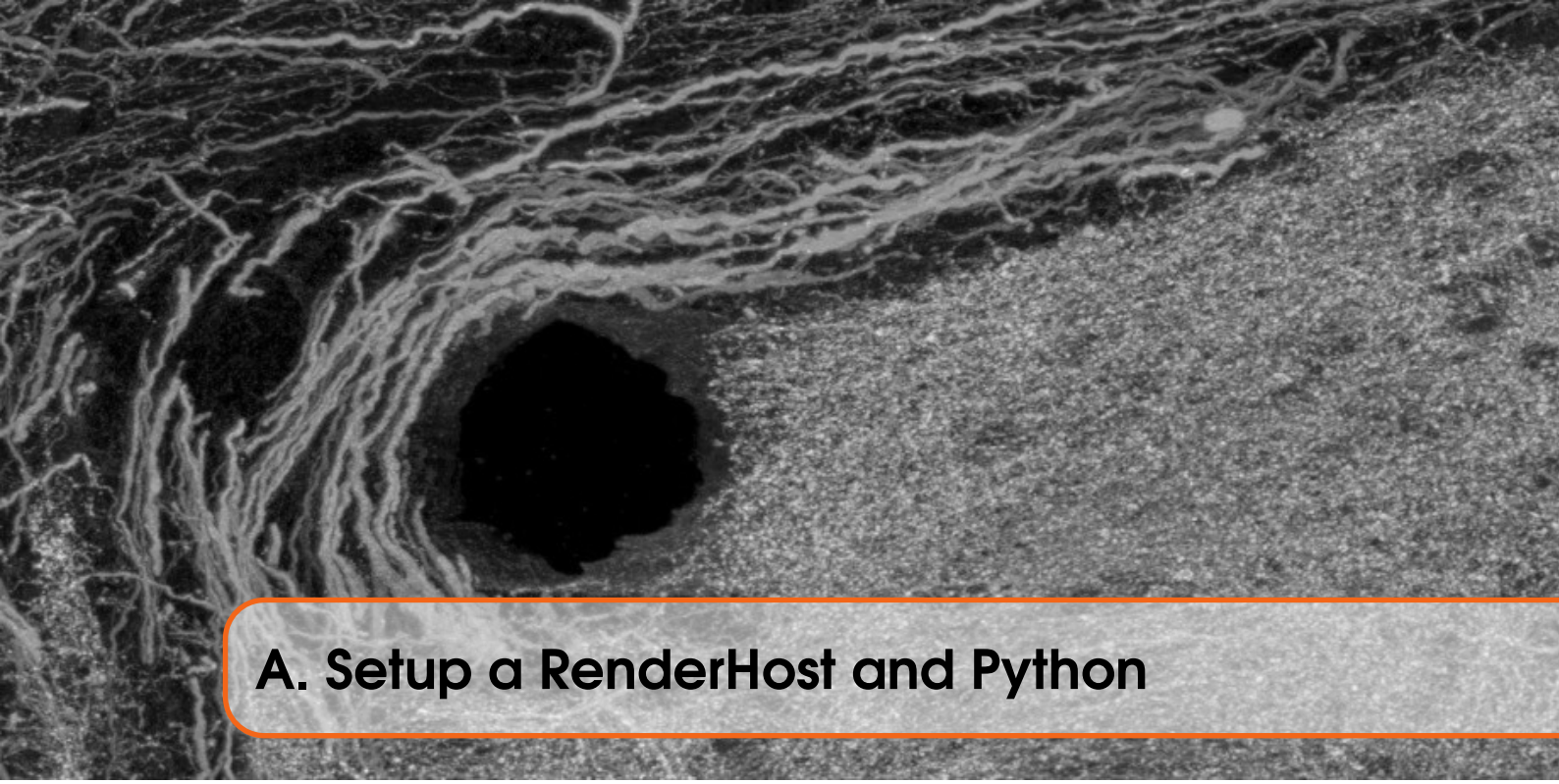
1.2.3 Connecting to a a Remote (or local) RenderHost

1.2.4 Managing Stacks in Render

1.2.5 Exploring Data

1.3 Python Bindings

Appendices



A. Setup a RenderHost and Python

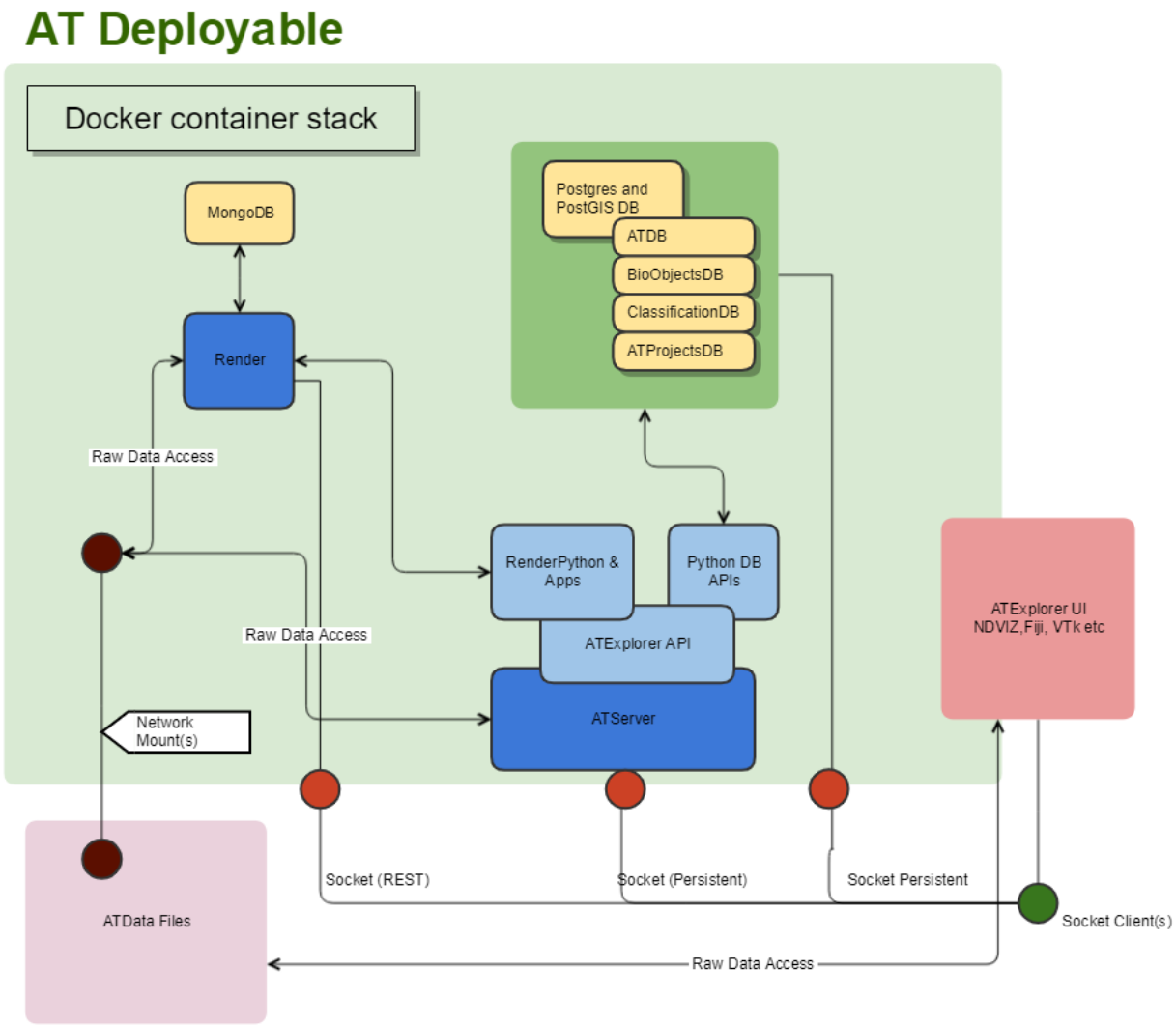
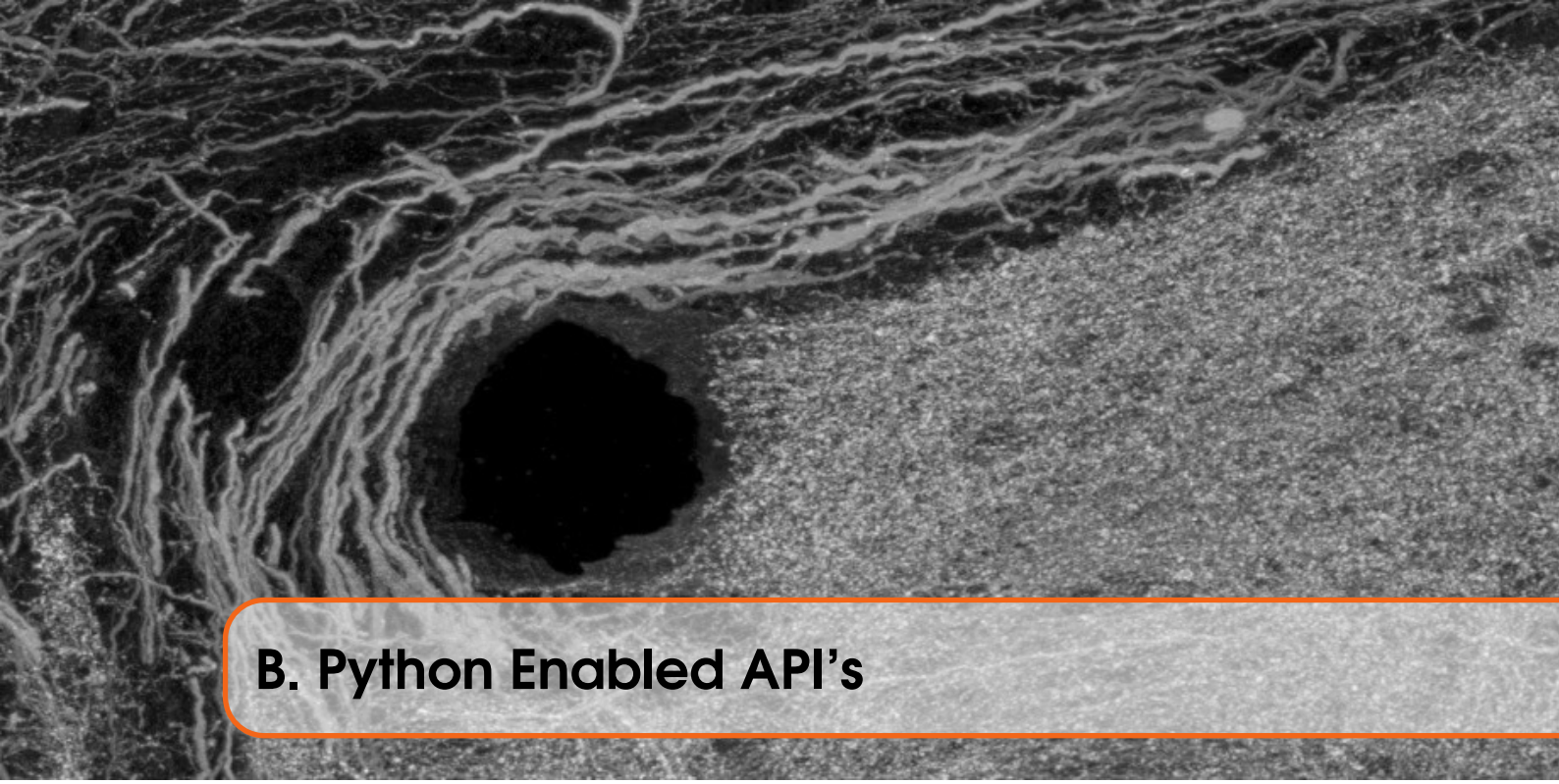
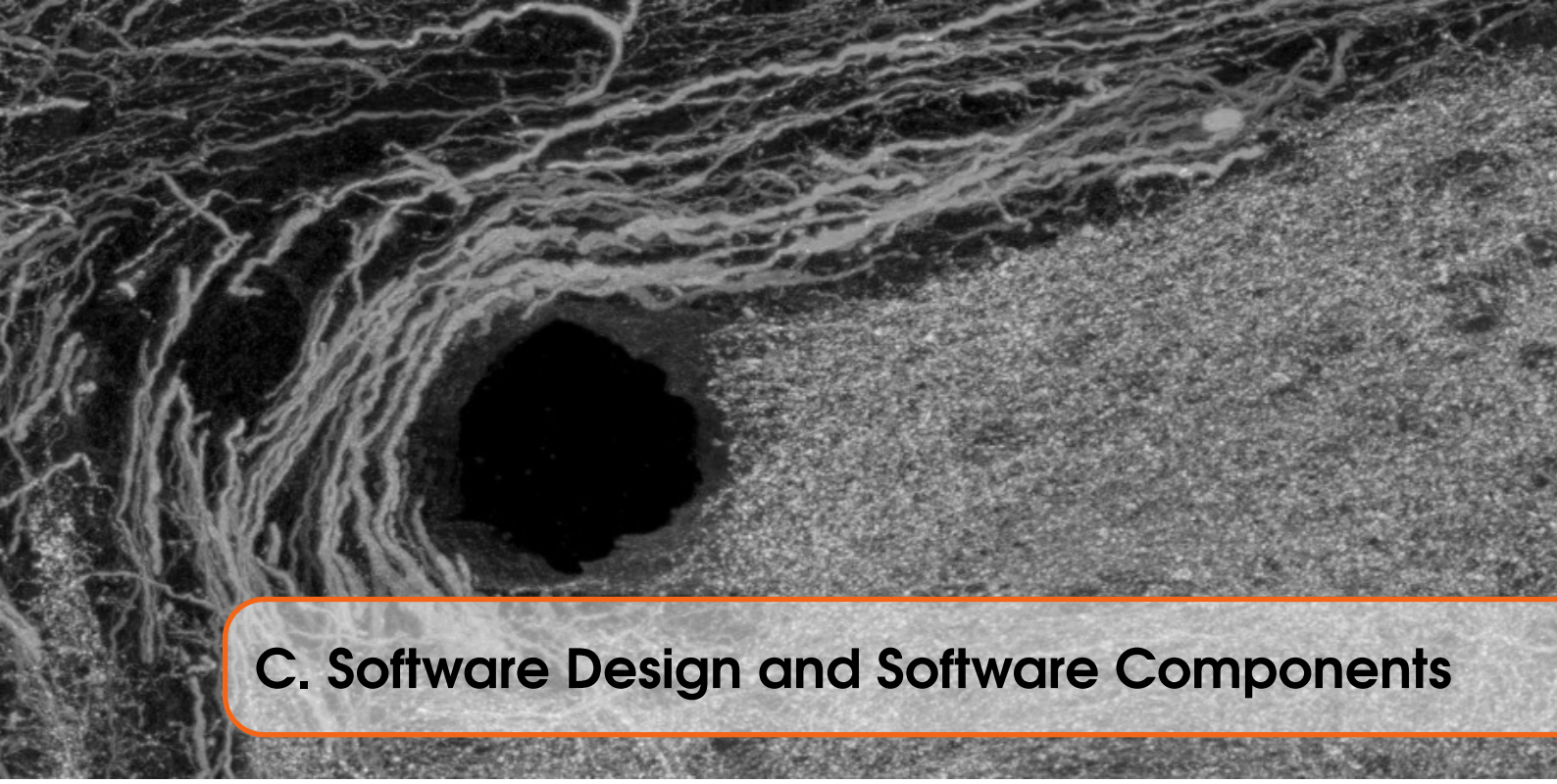


Figure A.1: A deployed system



B. Python Enabled API's



C. Software Design and Software Components

C.1 ATExplorer UI

The ATExplorer UI is Microsoft Windows desktop application implemented using Embarcadero's C++ Builder tools. This environment provide a programmer with hundreds of components for efficient and rapid development of Windows applications.

In addition, thousands of third party components are available as well. This appendix discusses some of the software designs used when implementing the ATExplorer

C.1.1 Observers and subjects

The Tree view and PageControl .

C.1.2 The TreeView

The items in the Treeview stores data objects as (void*) pointers. Any object registered with the tree (as a node) need to be a descendant of the class ExplorerObject. Typical scenario:

```
ExplorerObject* eo = (ExplorerObject*) node->Data


if(dynamic_cast<...>(eo))
{
...
```

```
}
```

C.1.3 Populating an ATData object

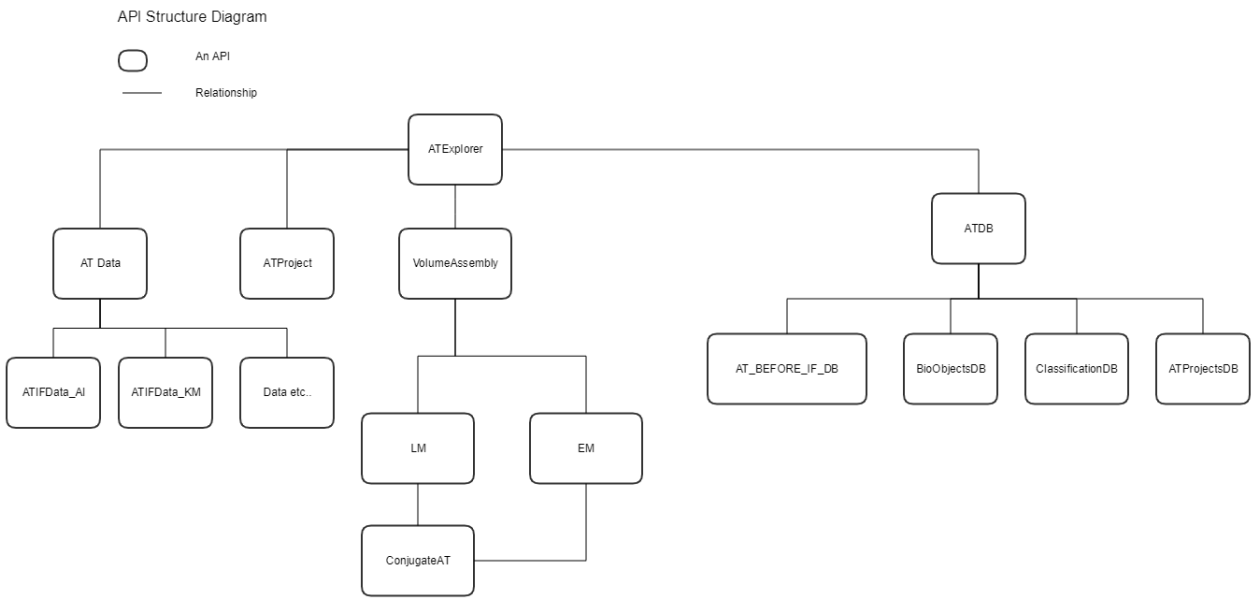


Figure C.1: An overview of some of ATExplorer API's

C.2 ATExplorer Software API's

C.2.1 atCore

C.2.2 atData

C.2.3 atVCLCore

C.3 ThirdParty libraries

C.3.1 Poco

C.3.2 libCurl

C.3.3 SQLite 3

C.3.4 TinyXML2

C.3.5 Dune Scientific libraries: dslFoundation

D. How to Build ATExplorer and its API's

Public Software Repository: **git@github.com** : **TotteKarlsson/ATExplorer.git**