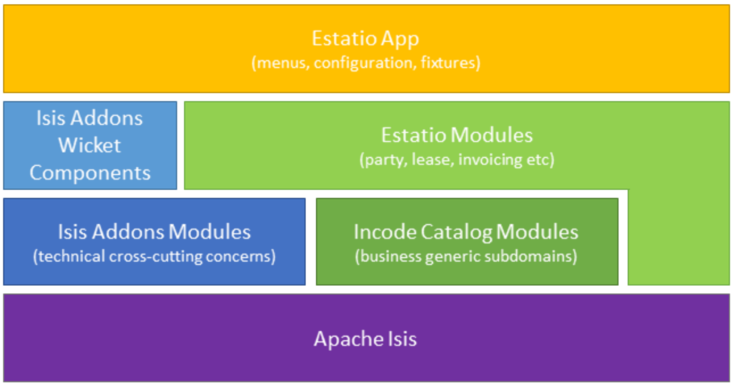
Incode Developers' Guide

This guide is intended for the developers of Estatio (and other applications).

Download PDF[1]

1. Architecture and Design

Incode applications (most notably Estatio) consists of multiple modules, deployed as a single WAR (a "modular monolith"). These modules are layered as follows:


Estatio App
(menus, configuration, fixtures)
Isis Addons Wicket Components
Estatio Modules
(party, lease, invoicing etc)
Isis Addons Modules
(technical cross-cutting concerns)
Incode Catalog Modules
(business generic subdomains)
Apache Isis

At the bottom is Apache Isis[2] framework. The (Estatio) application and modules depend on the framework in that its domain objects are annotated with Apache Isis and DataNucleus annotations, and use domain services provided by Apache Isis (such as `RepositoryService` and `TitleService`).

On top of that are a number of modules from Isis Addons[3]. These address technical cross-cutting concerns such as security, auditing, publishing, freemarker mail-merge and so-on. The (Estatio) domain objects don't (tend to) have any dependencies on these modules (though there are one or two mixins to allow the audit trail to be viewed, for example). These modules are versioned independently (following the versioning of Apache Isis itself).

1 https://raw.githubusercontent.com/incodehq/developers-guide/pdf/developers-guide.png
2 http://isis.apache.org
3 http://www.isisaddons.org

At about the same level of abstraction are modules provided by the Incode Catalog[4]. These provide functionality for various generic business subdomains, such as documents, notes, aliases and classifications. This functionality is expected/hoped to be reusable across multiple different applications. These modules are versioned independently (following the versioning of Apache Isis itself).

On top of these are a number of Wicket UI components, also provided by Isis Addons[5]. Like the modules, the Estatio domain objects don’t (tend to) have any dependencies on these Wicket UI components; the one exception is that objects that can be rendered on a map must implement the `Locatable` interface. These modules are versioned independently (following the versioning of Apache Isis itself).

On top of the generic business domain modules are the modules that contain the (Estatio) domain objects themselves, residing in Estatio (open source)[6] git repo. There is some integration between (Estatio) domain objects and these generic subdomains, for example to allow `Documents` to be attached to various domain objects (such as `Invoice` etc). To ensure modularity, these reside in separate maven modules, but are versioned together with all of them sharing a single parent `pom.xml`.

Finally there is the application itself.

In the case of Estatio, this consists of further maven modules again in the Estatio (open source)[7] git repo, notably the `estatio-app` module (defining the `EstatioAppManifest` and a number of menu services) and the `estatio-webapp` module (which configures the various UI components and builds the WAR file). These modules also versioned along with the Estatio domain objects mentioned above (they share the same parent `pom.xml`),

For Estatio as deployed as ECP, there is also a separate deployment which has a different webapp in a private (bitbucjet) repo, and which containing ECP-

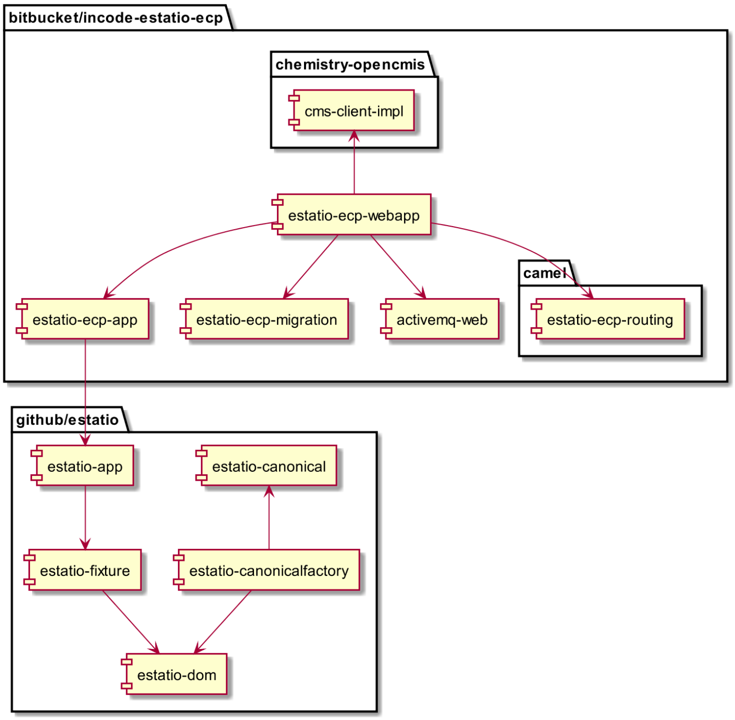
[4] http://catalog.incode.org
[5] http://www.isisaddons.org
[6] http://github.com/estatio/estatio
[7] http://github.com/estatio/estatio

specific integration with CMS, General Ledger etc using Camel, ActiveMQ and other integration technologies.

1.1. Estatio (ECP) Modules

Estatio (as deployed as ECP) consists of Estatio (open source)[8] along with a private repo (hosted in bitbucket) containing ECP-specific integration with CMS, General Ledger and stuff.

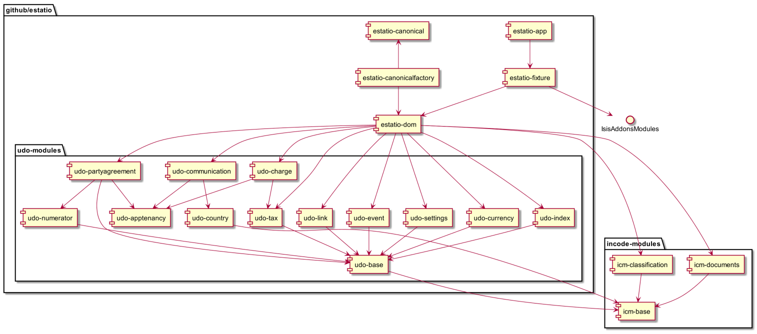
The modules that currently make up Estatio (ECP) are shown in this diagram[9], rendered from this PlantUML source (via asciidoctor-diagram):



[8] http://github.com/estatio/estatio
[9] :https://raw.githubusercontent.com/incodehq/developers-guide/master/images/estatio-ecp.png

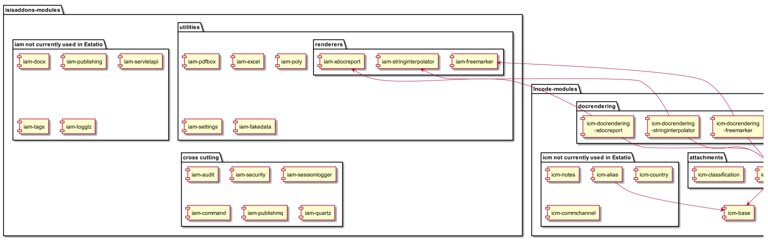
1.2. Estatio (Open Source) Modules

The modules that currently make up Estatio can be found in this diagram[10], rendered from the following PlantUML source (via asciidoctor-diagram):



1.3. Incode Modules / IsisAddons

The modules that make up Incode Catalog and the Isis Addons can be found in this diagram[11], rendered from the following PlantUML source (via asciidoctor-diagram):



[10] :https://raw.githubusercontent.com/incodehq/developers-guide/master/images/estatio-modules.png
[11] :https://raw.githubusercontent.com/incodehq/developers-guide/master/images/incode-and-isisaddons.png

2. Preserving the Architectural Integrity (aka "Cheese Moving")

2.1. As-is vs To-be

The UML component diagrams above represent the "to be" case; still to do:

- copy country from icm to udo
- rename udo-communication module and packages
- merge udo-apptenancy with udo-base

Longer term "cheese moving" goals:

- probably split `udo-partyagreement`, separate out `udo-party` and `udo-agreement` modules
- probably move `budgeting` package from `estatio-dom` to separate `udo-budgeting` module
- probably move `budgetassignment` package from `estatio-dom` to separate `udo-budgetassignment` module
- probably move `invoice` package from `estatio-dom` to separate `udo-invoice` module
- probably move "financial" packages from `estatio-dom` to separate `udo-xxx` module(s)

2.2. Modules and Schemas

In terms of how to get there, the preference is:

- all Incode catalog and Isis Addons modules should be in their own schema
- all Estatio code should be in the `dbo` schema
  - this is mostly because we haven’t yet found a way to make DataNucleus work with PK/FKs of entities in different schemas
  - note though that relationships between superclass/subclasses *can* be in different schemas (which is why the table-of-two-halves pattern as used by `incode-module-classification` and `incode-module-document` works ok)

- keep the code and the database DDL in sync
  - don’t rely on "hacks" such as `.orm` files
- use explicit (Apache Isis) `@DomainObject#objectType` and (DataNucleus) `@Discriminator` to ensure backward compatibility with persisted data

3. Idioms and Patterns

Include:

- separate out menu from repository, with the menus in `estatio-app`
- use `@MemberOrder` to associate actions with properties or collections
- don’t have actions called "change" or "edit"; search instead for the deeper business rule
- use mixins rather than contributions
- use `.layout.xml` for other layouts.
- follow conventional prefixes for action names, to automatically pick up CSS icons (hard-coded in `EstatioAppManifest`, search for "isis.reflector.facet.cssClassFa.patterns")

(There are many more, just not yet documented…)

4. Development Environment

4.1. IDE

We use IntelliJ; see Apache Isis documentation.

4.2. git

Check out the Estatio Open Source[12] version and also the ECP private version (from bitbucket).

[12] http://github.com/estatio/estatio

4.3. repo and foreach scripts

Use this gist[13] to provide the `repo` and `foreach` bash functions, along with the _repos.txt[14] config file listing the location of all repositories.

4.4. AsciiDoc documentation

We use Asciidoc for our documentation (such as it is). These reside in `adocs/documentation` directory, along with this README, of course. There is also some older non-Asciidoc documentation under `docs/` directory.

Recommended for editing Asciidoc[15], which is cross-platform. This provides side-by-side preview of the document (with sync'ed scrolling), and an outline view of the document.

Also, install GraphViz (to enable asciidiagram support, eg component diagrams above).

5. Development Practices

5.1. Kanban Boards

We maintain a (private) JIRA with two Kanban boards:

- Daily Stand-up, reviewed daily.
- Backlog, groomed weekly.

Periodically stories are moved from the "Backlog" board to the "Daily Standup" board.

5.2. Story lifecycle

(As its name suggests) the "Daily Stand-up" board is reviewed daily, and helps the team synchronize on work. For example, a story may need reviewing, in which case this can be flagged, or it may be blocked, awaiting input. The board itself defines the following columns:

[13] https://gist.github.com/danhaywood/21b5b885433fd8bc440da3fab88c91cb
[14] https://gist.github.com/danhaywood/938f0f751f756b1cfd6a9751b8779407
[15] http://asciidocfx.com/

- Next - longer-term stories (arrived from the Backlog)
- Current - work ready to put into play
- Blocked - awaiting input, eg from the business or external vendors
- In Progress - actively being worked on
- In Review - completed, waiting for review by some other team member
- Done - completed and merged into `master`, awaiting deployment.

We from right to left, looking to move stuff across the board.

If a new story is created in JIRA, then our workflow adds it to the "Current" column. This brings it to the attention of all for the next days stand-up (where it will either remain where it is, or perhaps be moved to the "Next" column or even the Backlog board if lower priority).

We aim to keep `master` deployable to production at all times. For all but the most trivial stories we use git branches and pull requests to allow stories to be reviewed by others in the team.

Overall then, the process is:

- identify the story, pull from "Current" column of "Daily Stand-up" board to "In progress", and assign to yourself.

  > It’s bad form to push work onto developers, rather developers pull work onto them.

- Identify what needs to be done.

  Generally this is an informal decision. As a quick checklist, consider:

  - which module will the change be made in
  - how will a feedback loop (typically be the business) be established
  - what unit tests are required
  - what integration tests are required
  - what DB migration scripts are required.

- Create and work in a new git branch

- If blocked on a story, and no-one is available to immediately assist, then move the story to "Blocked" and find some other work
- When done, push the branch and raise a PR. Move the story to "For Review". Ensure that any DB scripts that might need to be applied are clearly identified. Find someone to review the changes.
- With another developer, review the changes in the PR. If both happy, then merge the PR and push to `master`.

5.3. Style Guide

Commit message format

Use the format:

```
EST-xxxx: fixes the yada yada yada
```

that is, specifying the Jira issue number, and then a description of the change in the present tense.

For example:

- `EST-864: fixes bad reference to country-dom (was -SNAPSHOT, should be 1.13.0)`
- `EST-863 and EST-865: moves base and documentation module out to incode.`
- `EST-861: removes EstatioUserRole, with functionality moved to EstatioRole`

The idea of using present tense is that the commit history, when read back, can be read as: "this patch, if it was applied… "

Editing Asciidoc

Some guidance on writing Asciidoc (this list will likely grow in the future):

- Start each sentence in a paragraph on a new line.

  This makes it easy to spot too-long sentences, and sentences that are repetitive.

It also makes it easy to apply pull requests to documentation.

5.4. Multi-module development

(As discussed above), Estatio consists of multiple modules:

- Isis Addons[16], (technical) modules and wicket UI components each reside in their own git repo. These are versioned independently, generally tracking that of Apache Isis itself (eg `1.13.0`, `1.13.1`, `1.13.2` might all be releases running on top of Apache Isis `1.13.0`). They are re-released every time there is a new release of Apache Isis itself.
- Incode Catalog[17] (business) modules also each reside in their own git repo. These too are re-released every time there is a new release of Apache Isis itself.
- Domain objects specific to Estatio itself (`Party`, `Lease`, `Invoice` etc are in separate maven modules) within the Estatio (open source)[18] git repo. These are split into different to eliminate cyclic dependencies between modules (to avoid the big ball of mud).

  The Estatio application itself is also in maven modules within the Estatio (open source)[19] git repo.

For any given user story, we expect that changes should only need to be made to code in one module.

⚠ If we find that it isn't the case that any given user story only changes code in one module, then that is an indicator that the boundaries between the modules themselves maybe wrong, so should probably be reworked. In other words, we should ensure that the single responsibility principle[20] is followed: code that changes at the same rate should be grouped together.

[16] http://www.isisaddons.org
[17] http://catalog.incode.org
[18] http://github.com/estatio/estatio
[19] http://github.com/estatio/estatio
[20] https://en.wikipedia.org/wiki/Single_responsibility_principle

In the case where a user story changes functionality that resides within only te Estatio domain modules (in this git repo), then there's not much to be said: just prototype and make the change, then productionize with unit- and integration-tests.

The more interesting case is a user story which changes functionality within an Isis Addons[21]' (technical) modules, or an Incode Catalog[22] (business) modules:

* Most of these modules have their own demo apps and integration tests, so *in theory* one could build out the new functionality just within that demo app.
* However, context is king, so what we recommend instead is that you import into the IDE in the `-SNAPSHOT` version of the module to be changed, and update Estatio locally to reference that `-SNAPSHOT`.
* You can then prototype and develop the changes.
* When the feature is more or less there, then switch back to the demo app and productionize the changes by adding in any unit- and integration tests for the functionality that has been prototyped.

⚠ Not all of the modules have their own demo app. In such cases, ideally it would be best to take the time to create a demo app first, then proceed as above. But, if that time can't be justified, then just develop and test the changes within Estatio.

The Estatio application itself MUST NOT have dependencies on `-SNAPSHOT` versions (because otherwise we lose traceability). Thus, for those stories where a module has been revised, a new interim release must be created of that module. This is done using the `interim-release.sh` script.

You will find that the `README` for each module explains how this is done; basically though it's just a matter of running a command such as:

```
sh interim-release.sh 1.13.0 origin
```

where:

[21] http://www.isisaddons.org
[22] http://catalog.incode.org

- `1.13.0` is the base release (adjust as necessary)
- `origin` is the repo to push back to.

Estatio's CI server (on CloudBees) will then create a new timestamped build, eg `1.13.0.20161017-1231`; this is published to the Snapshot repository[23], eg for the Incode Catalog[24] or the Isis Addons modules[25].

Finally, update Estatio to depend upon this newly minted interim version.

5.5. Deploying to Dev or Test servers.

In the `estatio-ecp` repo the `deploy-tomcat8.sh` script can be used to deploy. See the `README` in the private ECP repository for more info.

Testing email

We use debugmail.io[26] for testing. This provides an SMTP service and a web UI that lets the emails received be inspected and optionally forwarded onto a "real" email account. See the `README` in the private ECP repository for more info on how to run the application with the correct configuration properties to test this.

5.6. Releasing and Deploying to Production

Periodically the code in `master` will be deployed to production.

First it is released, then deployed.

To release the open source version, use eg:

```
repo est
sh release.sh -j EST-1234 -r 1.7.0 -s 1.8.0-SNAPSHOT
```

where:

- -j is the JIRA number

[23] http://repository-estatio.forge.cloudbees.com/snapshot/
[24] http://repository-estatio.forge.cloudbees.com/snapshot/org/incode/module/
[25] http://repository-estatio.forge.cloudbees.com/snapshot/org/isisaddons/module/
[26] https://debugmail.io

- -r is the release version
- -s is the next snapshot version

Then, for the `estatio-ecp` repo, use the same command, eg:

```
repo ecp
sh release.sh -j EST-1234 -r 1.7.0 -s 1.8.0-SNAPSHOT
```

6. Appendices

6.1. How to generate this guide as a PDF

This guide can be generated as a guide simply by loading into AsciidocFX and then saving as a PDF. Copy into the `pdf/` folder.

6.2. How to generate the AsciiDoc pages

For the AsciiDoc pages in `adocs/documentation`, just run:

```
cd adocs/documentation
mvn site
```

The `.html` will be generated in `target/site`. It should be possible to load the HTML straight from the directory. Alternatively, load from a webserver, eg:

```
python -m SimpleHTTPServer
```

and browse to http://localhost:8000.

The `mvn` script also generates docbook XML and PDF, but there are some caveats:

- the PDF currently does not include images at all.
- Using asciidoctor-fopub[27] the XML can be converted to PDF; however there are currently some issues with images being scaled correctly.

[27] https://github.com/asciidoctor/asciidoctor-fopub