LibreOffice: Code Structure

Hermenutical keys to a complex code-base

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"Stand at the crossroads and look; ask for the ancient paths, ask where the good way is, and walk in it, and you will find rest for your souls..." - Jeremiah 6:16

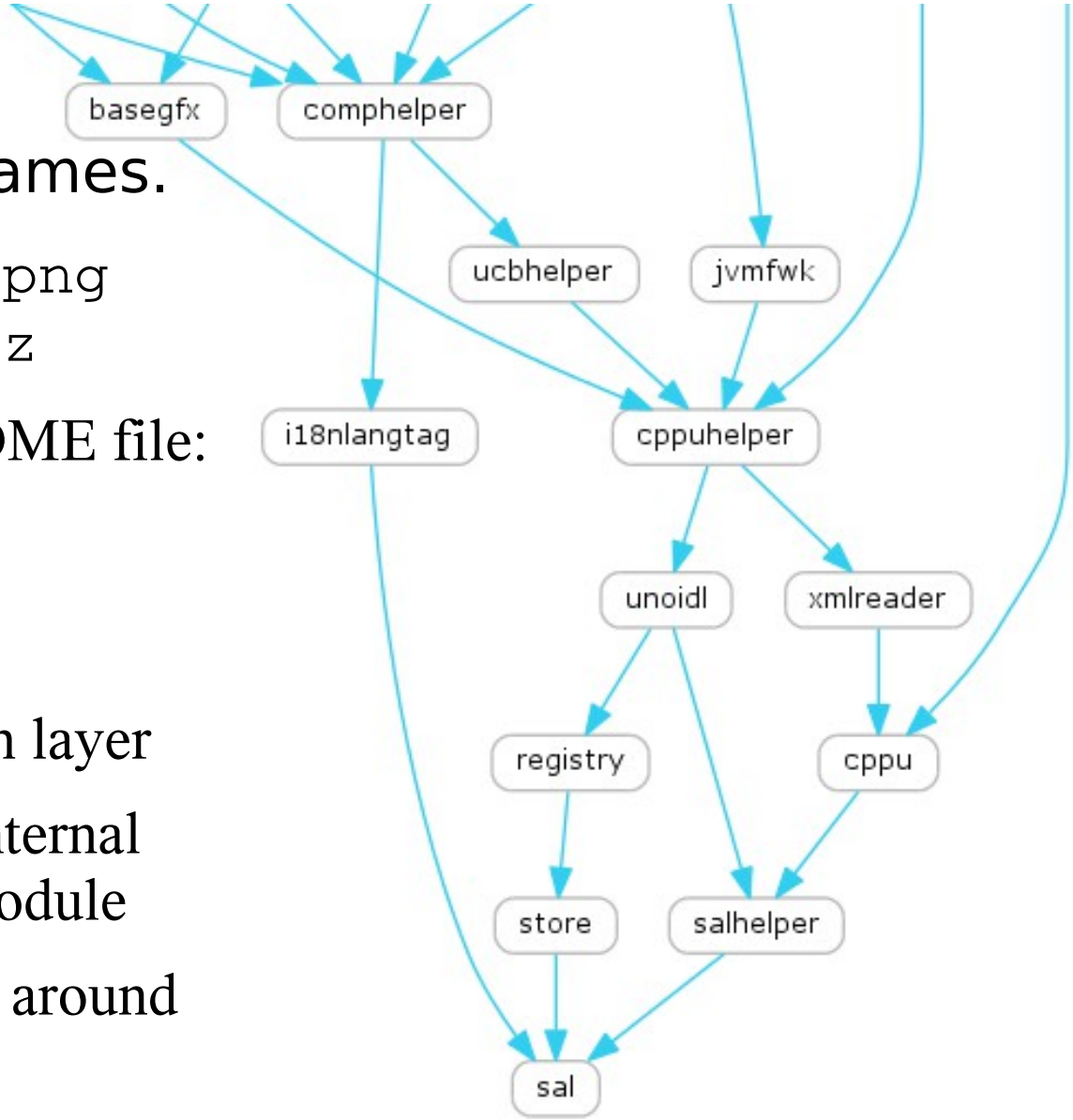
Overview / Agenda ... Chunk #1

- Codebase overview
  - Internal core modules, internal leaf, (ignore externals)
- Build + package: gnumake + scp2
- Code organisation / git bits
- Bear in mind: this is a 20 year old code-base
  - The code-base is rather better than can be expected, and things continue to improving over time.

Module overview – lowest level

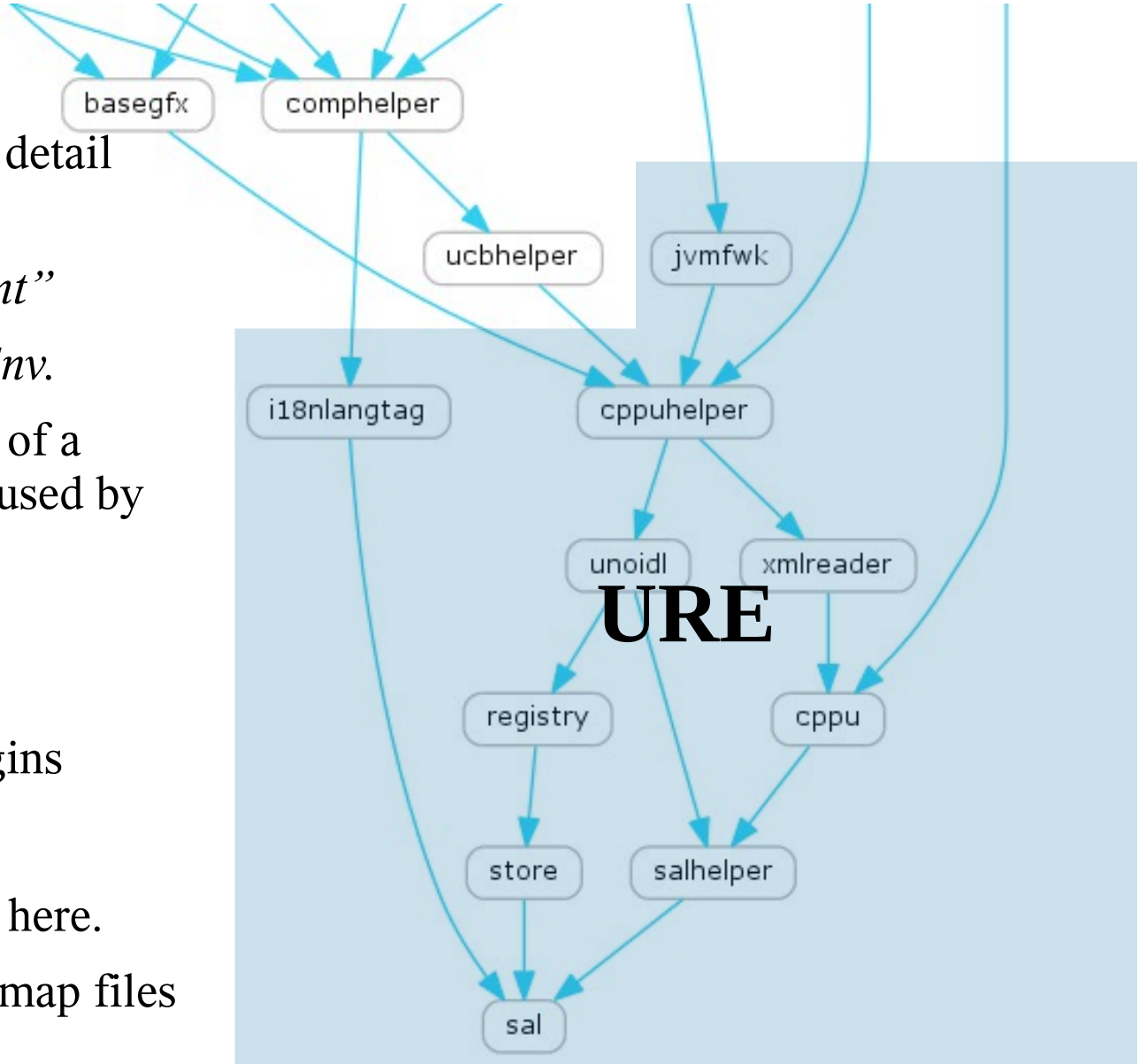
Internal non-leaf modules: UNO modules

- Top-level directory names.
  - `make dump-deps-png`
    `# needs graphviz`
- Each module has a README file:
  - eg. sal/README
- *sal:* - at the bottom
  - The system abstraction layer
  - '*tools*' is an obsolete internal ~duplication of this module
- *salhelper:* - wrapper code around *sal* – also part of URE



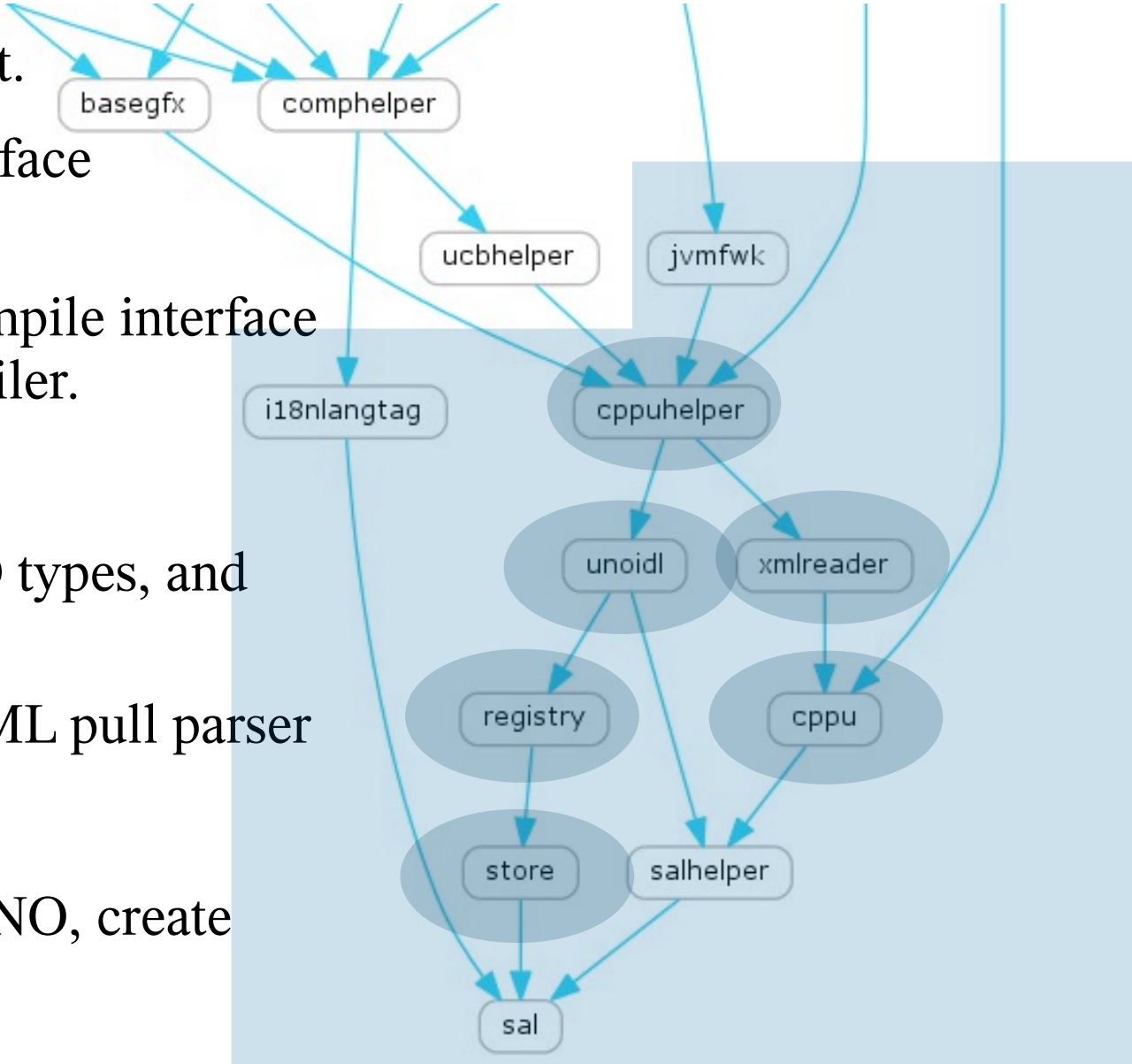
What is the Uno Runtime Environment (URE)

- We'll come onto UNO later in detail but … for now:
  - *"Uno Runtime Environment"*
  - *cf. JRE → Java Runtime Env.*
  - Belongs to the pipe-dream of a world where UNO was re-used by other applications.
- Provides an ABI / API stable abstraction layer for the suite
  - So you can write C++ plugins
- Careful:
  - We have to watch our ABI here.
  - ABI control via C symbol map files



UNO module dissection

- *store:* obsolete & irrelevant.
- *registry:* used to keep interface descriptions
- *unoidl:* used to create / compile interface descriptions: an IDL compiler.
- *cppu:* C++ UNO
  - Implements basic UNO types, and infrastructure for C++
- *xmlreader:* very simple XML pull parser
- *cppuhelper:*
  - luggage to bootstrap UNO, create UNO components etc.



More associated modules

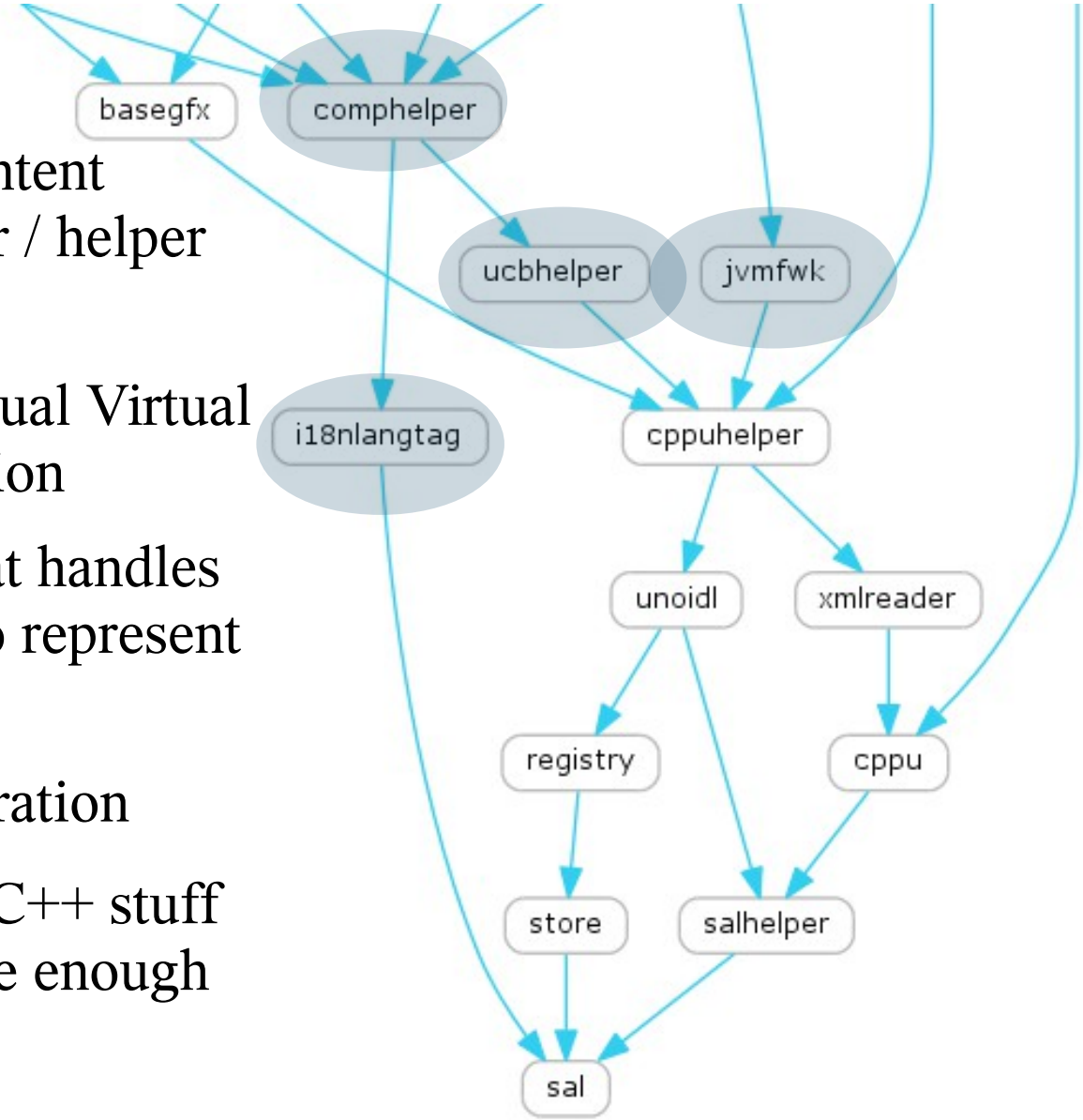
ucbhelper – Universal Content Broker (ucb) C++ wrapper / helper classes

- *ucb* - Provides an unusual Virtual Filing System abstraction

i18nlangtag: – module that handles BCP47: a powerful way to represent subtle language / locales

jvmfwk: Java / UNO integration

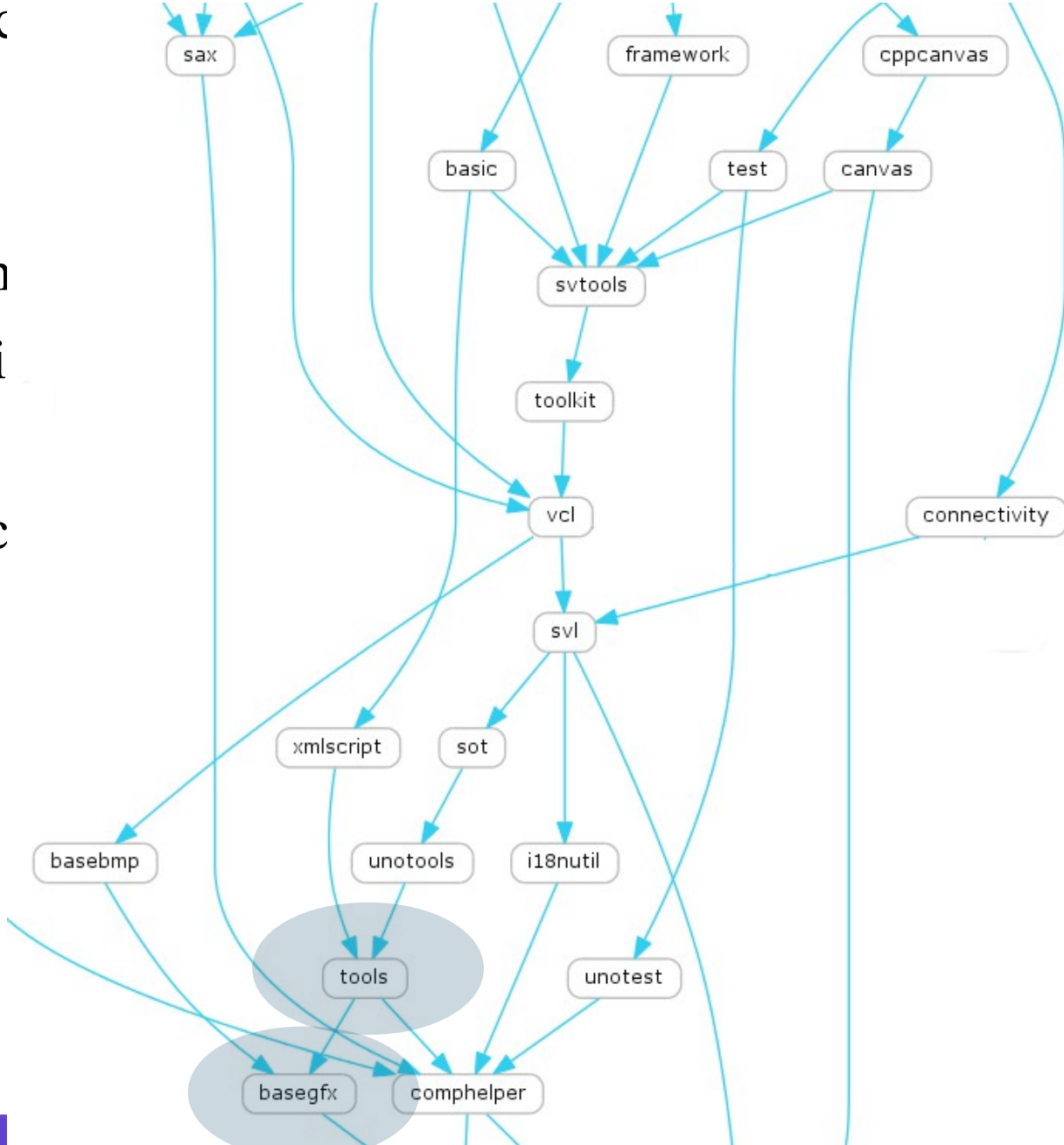
comphelper: lots of good C++ stuff for using UNO – not stable enough to go into the URE



Module overview – middle level

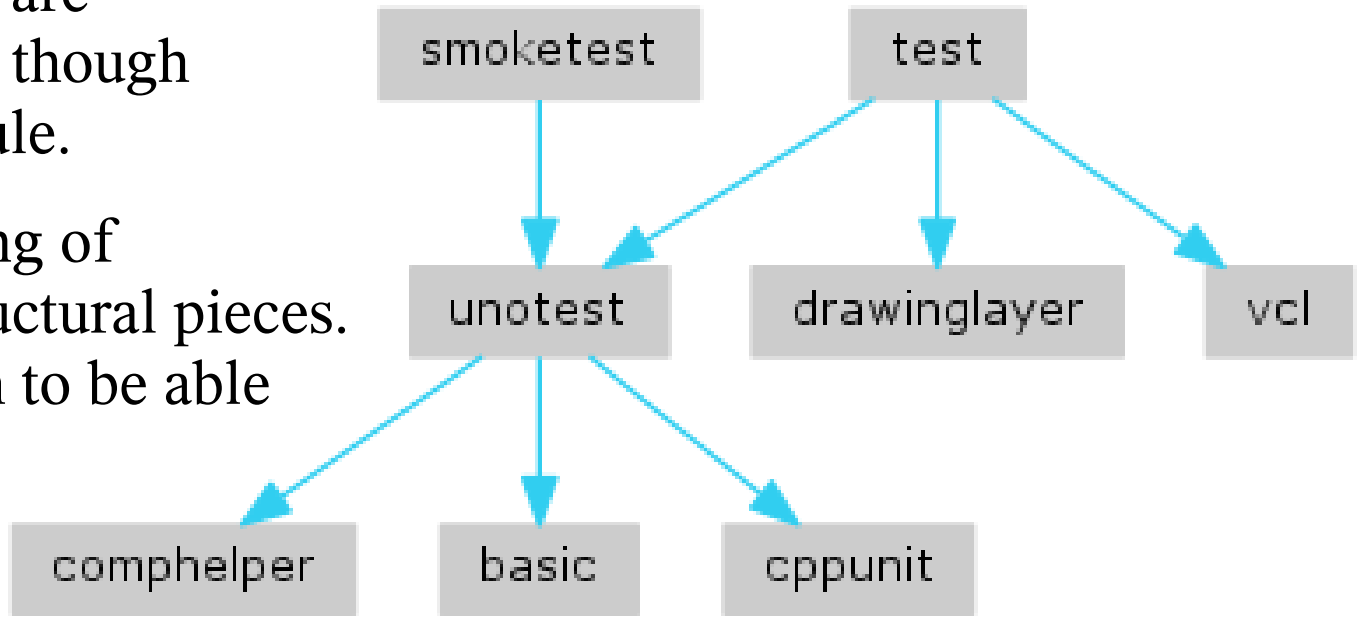
More associated modules

- *basegfx* – algorithms / graphic etc. for basic graphics.
- *tools:* – more basic types:
  - SvStream – internal strean
    - vs. UCB vs. sal/ file pi
  - Color COL_RED etc.
  - INetURLObject – canonic URL handling
  - SolarMutex (the big lock)
  - Resources, translation
  - Polygon / PolyPolygon
  - Date / Time classes
  - A total grab-bag of things



Unit testing pieces:

- *cppunit:* - ~all our tests are ultimately cppunit tests though this is an external module.
- *unotest:* low level testing of simpler / UNO infrastructural pieces. Bootstrap UNO enough to be able to test filters, components etc.
  - All of that requires types / services, configuration etc.



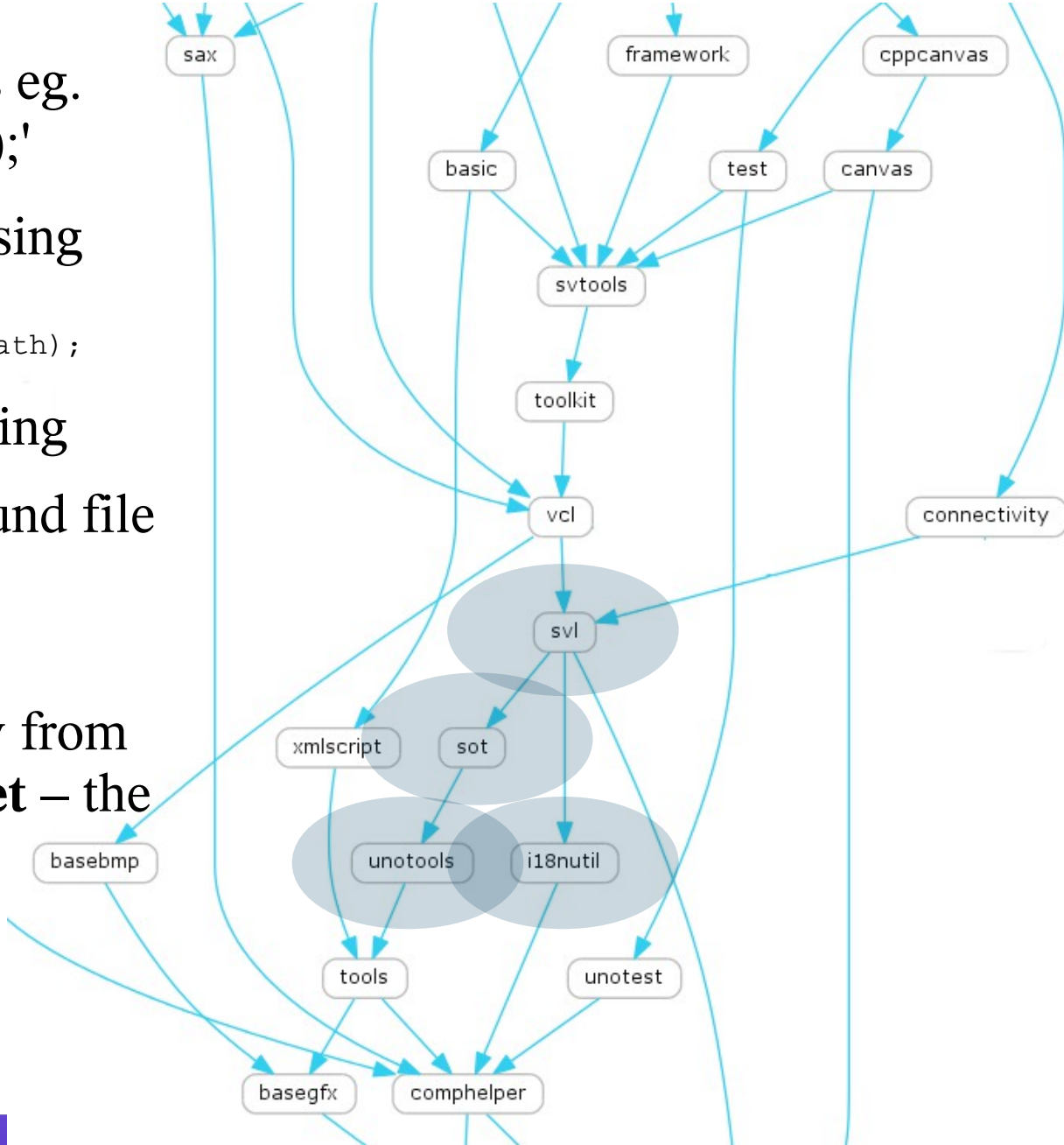
- *test:* helpers for testing standard interfaces, more advanced tests: brings UCB bootstrap (for streams), VCL initialization, graphic filter pieces etc.
- CppUnit*_.mk files in directories

Other non-graphical bits ...

- *i18nutil:* - 'honest C++ code' wrapping UNO l10n madness eg. 'bool isUpper (sal_Unicode c);'
- *unotools:* - C++ helpers for using UCB eg.

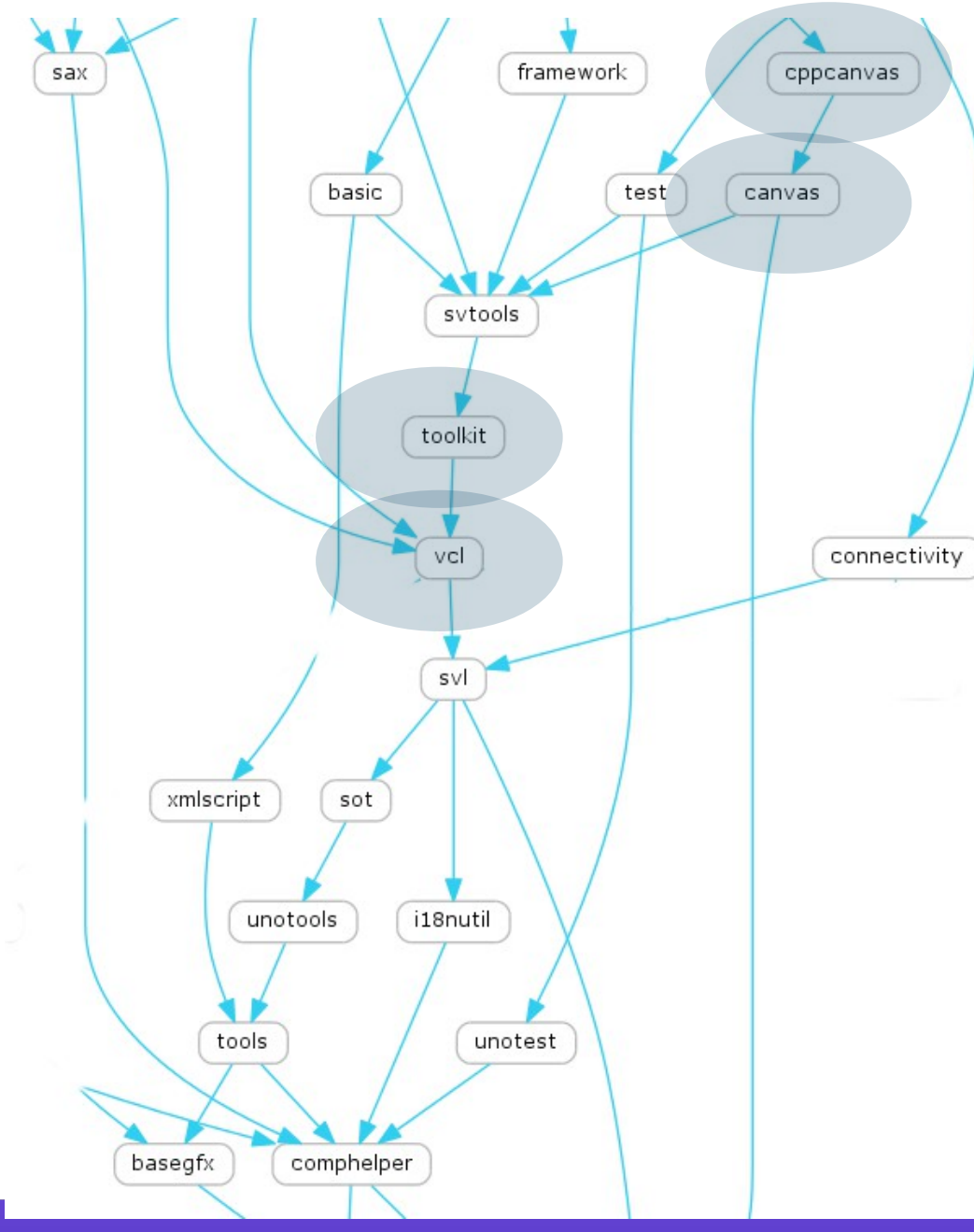
```
SvStream *CreateStream( OUString &rPath);
```

  - Misc. font & config handling
- *sot:* - handles OLE2 / compound file storage for binary documents
- *svl:* - non-graphical (no VCL dependency) pieces originally from svtools/ or sfx/ eg. **SfxItemSet** – the key C++ property-bag class
  - Undo/Redo, and more ...
  - 'tools' but higher up ...



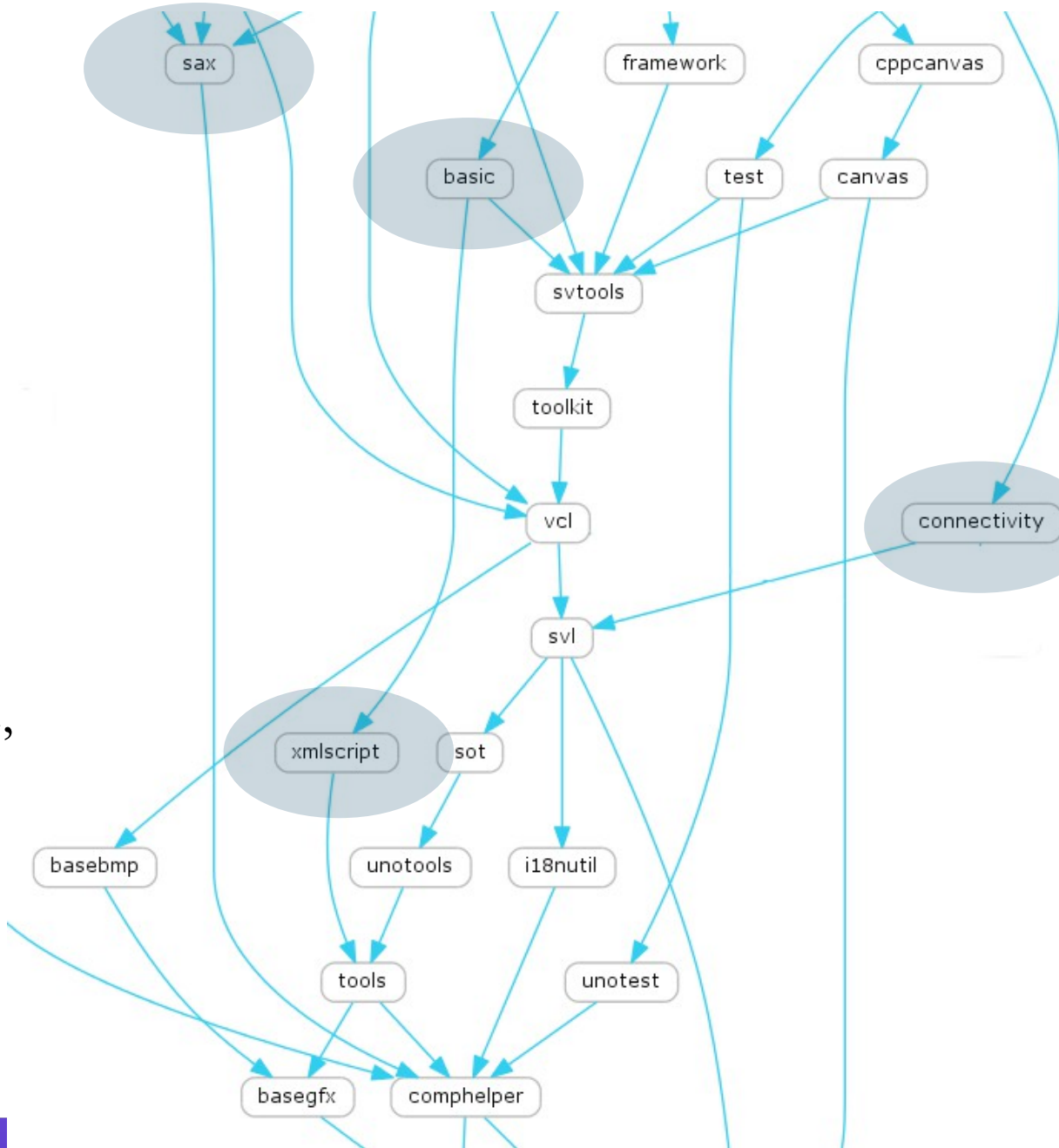
Graphical / toolkit pieces ...

- *vcl:* - Visual Class Libraries – the LibreOffice graphical toolkit, on this – more later.
- *toolkit:* - a particularly thin & horrible UNO API wrapper with Model/View flavour on top of vcl.
- *canvas:* - alpha transparent, anti-aliased UNO rendering API – more modern rendering than VCL, primarily used by *slideshow*
  - DirectX, Cairo & VCL impls.
- *cppcanvas:* - C++ wrappers to make using the canvas less bad.



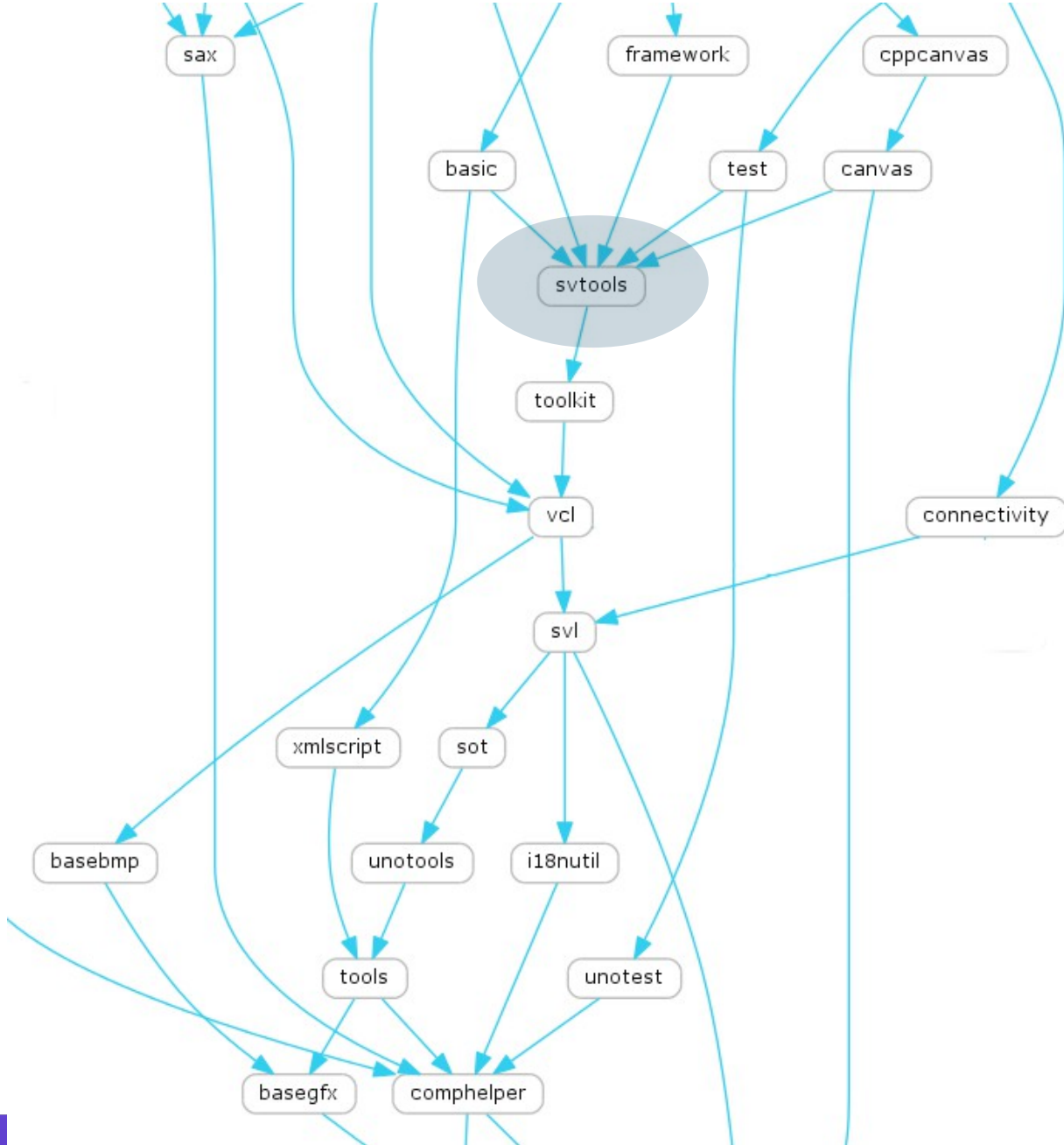
Non-Graphical grab-bag ...

- *basic:* - the StarBasic parser / interpreter & run-time.
- *xmlscript:* XML serialisation of (orrible) basic dialogs which wrap the toolkit pieces for in-document scripting / macro dialogs.
- *connectivity:* - UNO implemented database drivers for all manner of backends:
  - Postgresql, MySQL, Mozilla addressbook, Evolution, JDBC, ODBC etc. etc.
- *sax:* - wrapper of libxml2 – providing an UNO sax API for parsing XML files, and an XFastParser for tokenising them.



Graphical grab-bag

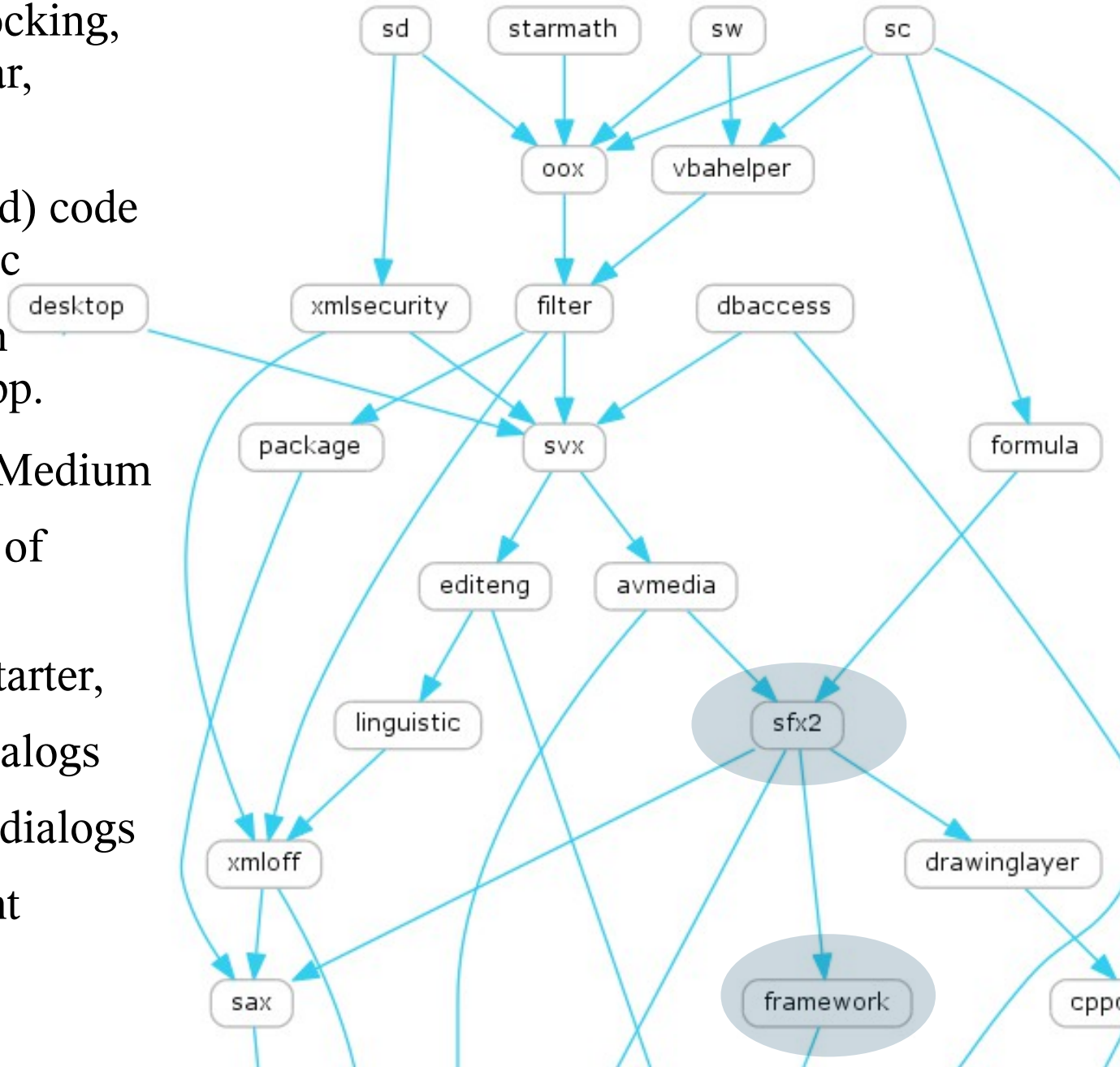
- *svtools:* - lots of pieces
  - tree / list controls
  - table control
  - dialog helpers
  - accessibility helpers
  - options wrappers
  - print dialogs
  - filedialog helpers
  - imagemaps
  - wizard helpers etc.



Module overview – upper level

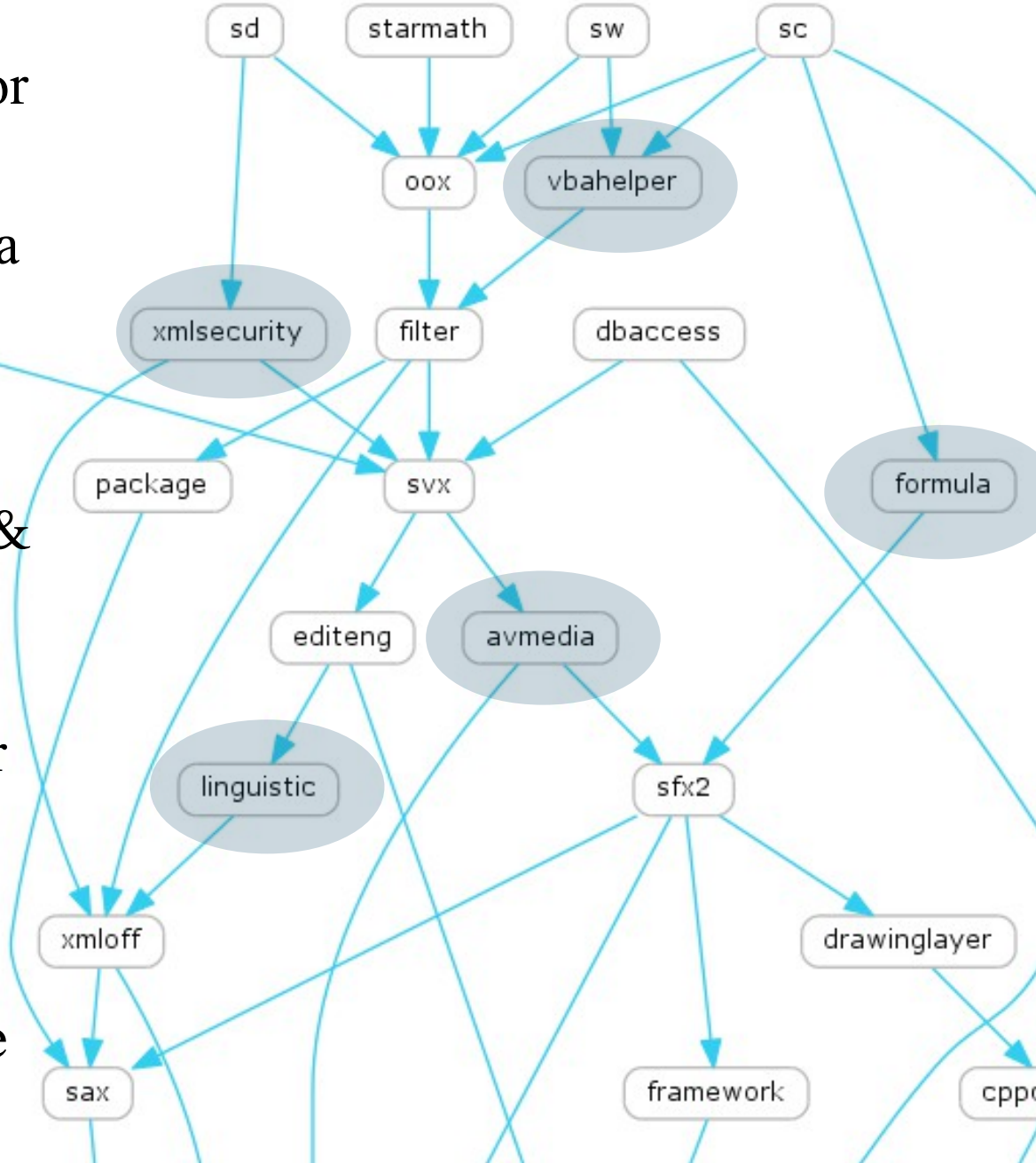
Document / Chrome pieces ...

- *framework:* - manages docking, toolbars, menus, status bar, sidebars, task-panes
  - 'new' (over-engineered) code with heavy UNO logic
- *sfx2:* - works closely with framework, core of the app.
  - load / save logic: SfxMedium
  - manage views on top of framework
  - 'Help' pieces, quick-starter,
  - Dialog helpers: tab dialogs
  - Document meta-data dialogs
  - Template management
  - Shared style pieces.



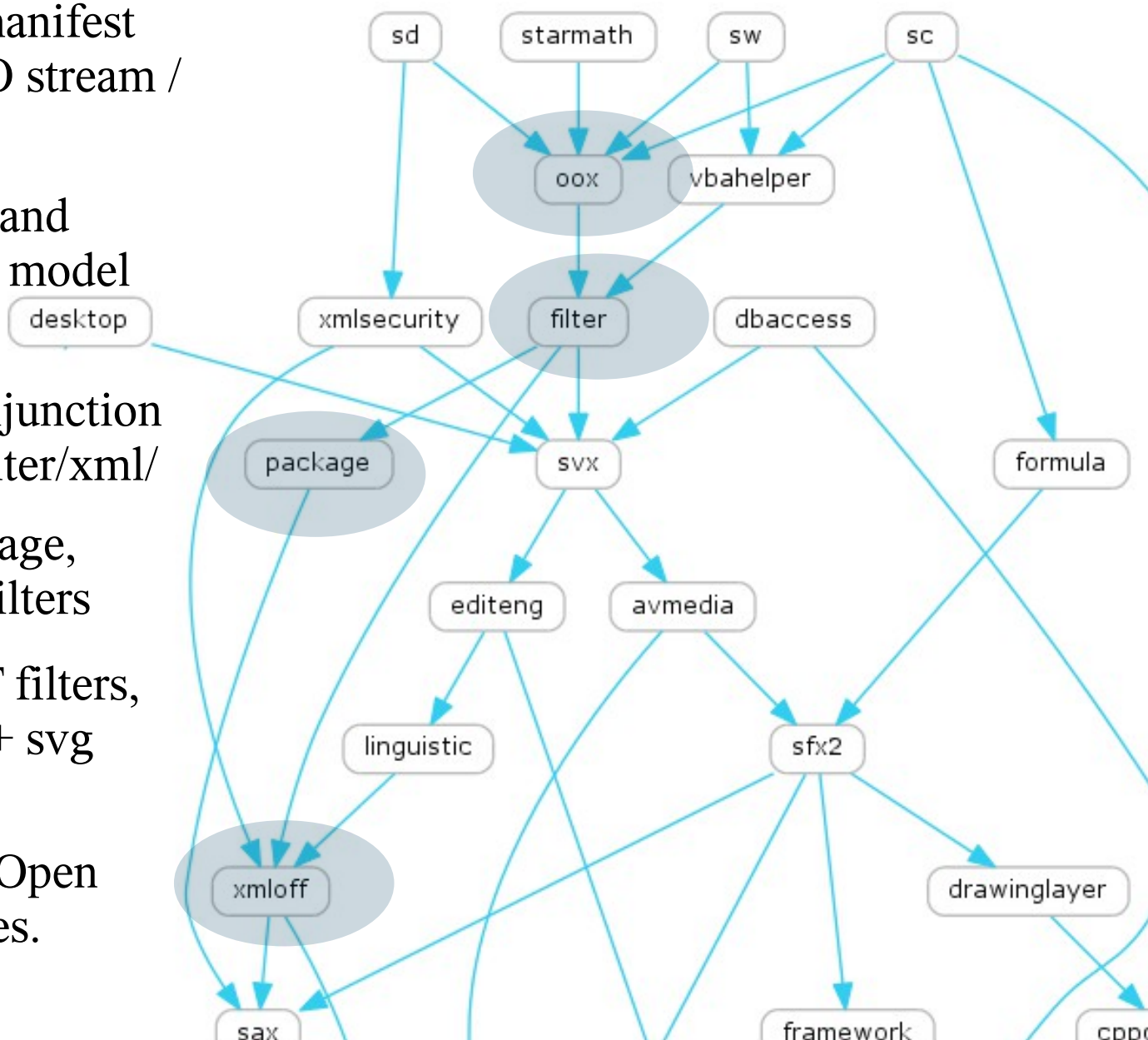
Miscellaneous pieces

- *formula:* - nominally shared code extracted from calc (*sc*) for use in *reportdesign*
- *avmedia:* - Audio / Video media – multimedia abstraction over DirectX, quicktime, gstreamer
- *linguistic:* - implements UNO services for spell / hyphenator & thesaurus.
- *xmlsecurity:* - XML document encryption and signing used for ODF.
- *vbahelper:* - helper code for implementing VBA / macro interoperability with MS Office



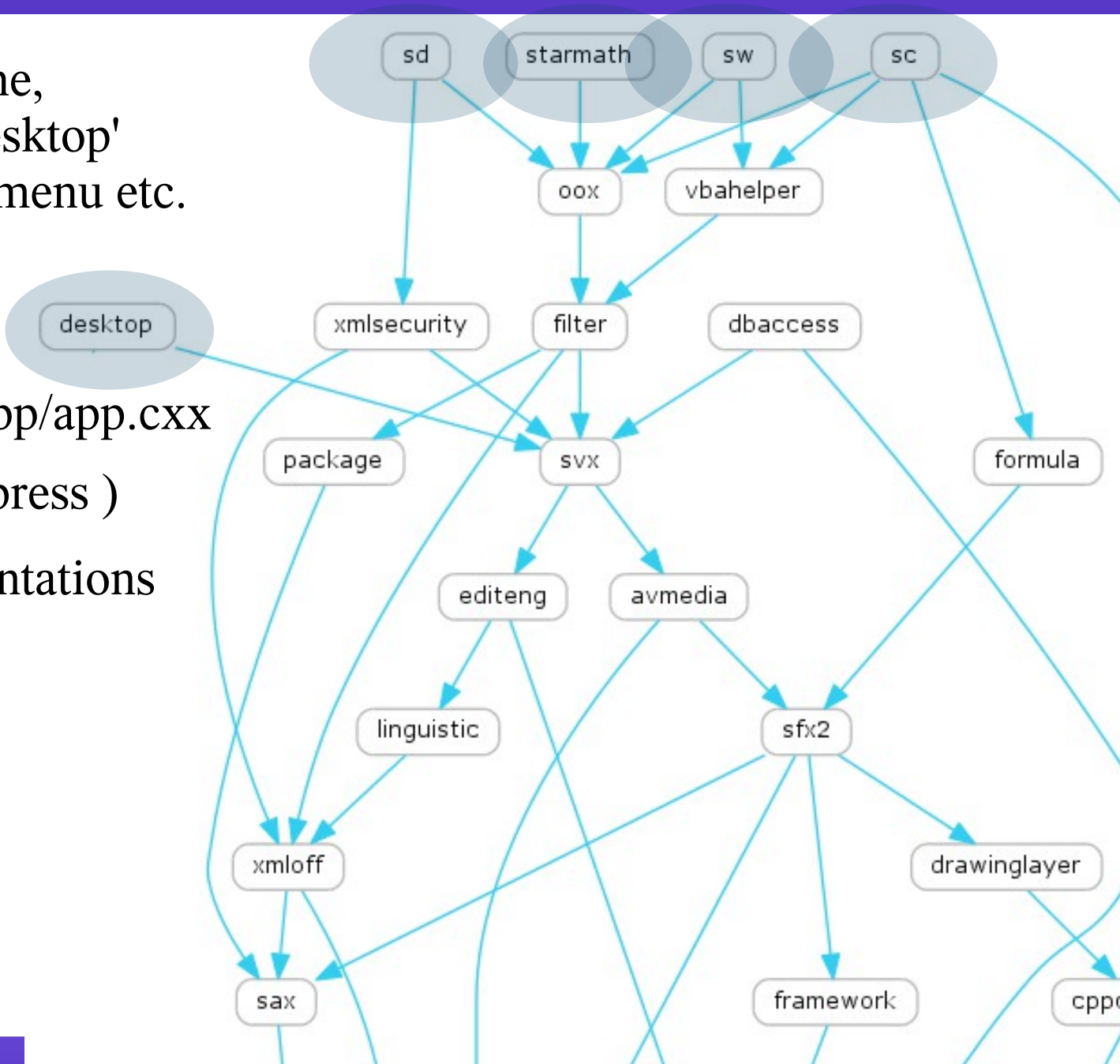
Load / save / filter logic ...

- *package:* - ZIP file compress / de-compress, also handles manifest files in the .zip with UNO stream / storage interfaces
- *xmloff:* - ODF file filters and helpers to load / save our model to/from ODF.
  - Often working in conjunction with eg. sw/source/filter/xml/
- *filter:* - meta-data to manage, register and auto-detect filters
  - Also flat-ODF, XSLT filters, graphic filters, flash + svg export & more.
- *oox:* - shared MS Office Open XML (import) filter pieces.



Applications ...

- *desktop:* - legacy name, StarOffice 5 had a 'desktop' complete with 'Start' menu etc.
  - here lives the real 'main'
  - desktop/source/app/app.cxx
- *sd:* - Star Draw (Impress)
  - Drawings + Presentations
- *sw:* - 'Star Writer'
  - Word processor
- *sc:* - Star Calc
  - Spreadsheet



Caveats: this is a simplified picture

- That was just the non-leaf nodes.
- This is a linking dependency graph
  - UNO component use is hard to graph / grok.
    - fundamentally a dependency breaking technology.
- other important bits:
  - *cui:* - a big bag of dialogs – split to avoid loading
  - *ucb:* - Universal Content Broker
  - *chart2:* - embedded chart rendering and model
  - *slideshow:*- the piece that renders your slideshow.
  - *solenv*:- where build infrastructure lives.

Build + Package

Build: configure etc.

- autoconf / configure reasonably sane
  - autogen.sh – a wrapper around autotools
    - builds & runs configure script etc.
    - keep your parameters in **autogen.input**
  - Builds:
    - config_host.mk from config_host.mk.in
      - This contains all the variables we need.
    - config_host/*.h – from templates
      - containing the build configuration.

Android / Online build

- Android
  - Normal core.git, configure nicely:

    `--with-android-ndk, --with-android-sdk etc.`

    - Checkout README.android
  - Binaries end up in android/ as APK files.
- Online
  - Normal autotools style configure / make / make run.
  - Ensure you use:

    `--with-lo-path=core.git/instdir`

    `--enable-debug`
  - To get working unit tests

Build: gnumake ...

- gnumake used in some odd ways
  - code is in solenv/gbuild/
  - Each module has it's own Makefile
    - You can build each independently after a full-build.
    - All rules are built by $(call Function,...) magic, we don't use generic / built-in rules.

      => if something is compiled – we have an explicit rule for it (somewhere)
  - Following the rules is not trivial: $(1) → $(7)

Build: output ...

- We build a working image into 'instdir/'
  - instdir/program
    - Contains a runnable image post 'make'
      - The authoritative location for libraries
    - make && instdir/program/soffice.exe

- workdir/*
    - object files, and build intermediates here
    - generated headers
    - unpacked external source code etc.

Finally – key modules in build...

- *postprocess*
  - *packimages/*
    - Using solenv/bin/packimages.pl – build icon theme .zip and sort it by access pattern
  - *CustomTarget_registry.mk*
    - Build configuration files from officecfg/
  - *Rdb_Services.mk*
    - Build services.rdb file from .components
- *officecfg/*
  - Home of all defaults / office configuration / settings

Internal module organisation ...

- *include/*
  - All global includes live in *include/<module>/*
- *sfx2/inc* - includes local to module
  - *source/** - source code for module
  - *source/inc/* - other includes local to module
  - *uiconfig/* - new-style XML UI descriptions
  - *sdi/* - descriptions of slots / actions
  - *qa/* - *unit tests, test file data etc.*
- *Lots of things moved over time:*
  - `git log -u --follow - include/sfx2/new.hxx`
    - Only works for one file

Questions / conclusions

- Are you still alive ?
- That was very dense and high-level
- Hopefully it's useful.
- We have a lot of modules
  - You can safely not know about the vast majority of them.

Oh, that my words were recorded, that they were written on a scroll, that they were inscribed with an iron tool on lead, or engraved in rock for ever! I know that my Redeemer lives, and that in the end he will stand upon the earth. And though this body has been destroyed yet in my flesh I will see God, I myself will see him, with my own eyes - I and not another. How my heart yearns within me. - Job 19: 23-27