Developing MadGraph5

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MadGraph 5

- A Collaborative platform for matrix-element related development

- takes various input

  - MODEL

  - PROCESS

- and produces various output

  - Standalone (C++/Fortran)

  - Pythia 8

  - MadEvent

  - More in development

jeudi 10 mai 2012

1.4.0

MG5 is moving very fast

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**NOT a small project
=> Need some guidelines**

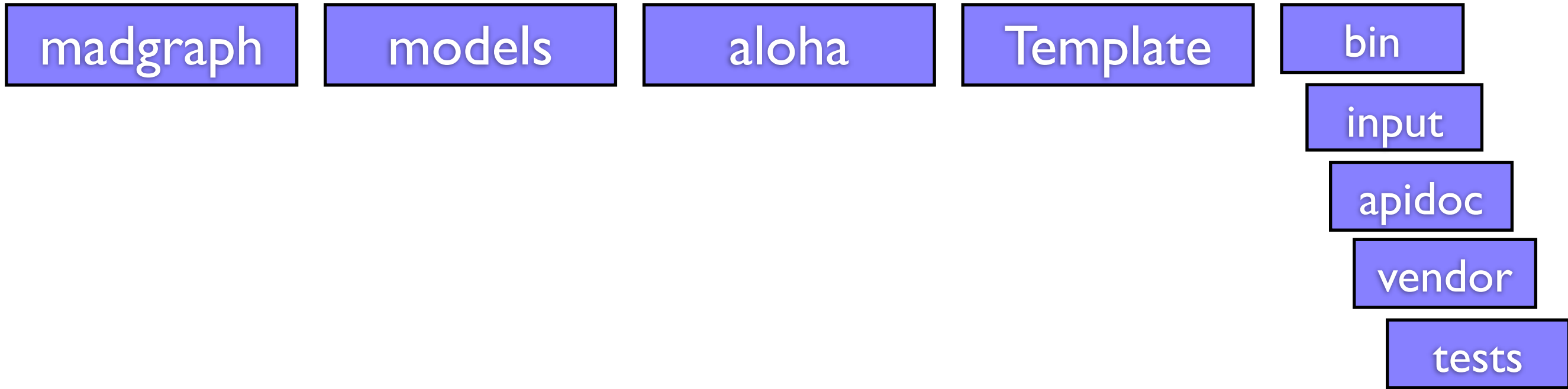1.4.0

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Languages

- Python
  - Easy to Learn/Read
  - Object Oriented
  - Lot of Library
  - Very Flexible
  - Not Compiled
  - Possibility of easy test suite

- Fortran
  - Very fast
  - Very basic => Good for heavy numerical computation.

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Languages

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  No Perl / Bash / csh / ...

  - Not Compiled
  - Possibility of easy test suite
- Fortran
  - Very fast
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Structure of the code

madgraph

models

aloha

Template

bin

input

apidoc

vendor

tests

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Structure of the code

madgraph

Python source code for MadGraph 5

models

UFO interface UFO and v4 models

aloha

Source code for output of ALOHA helicity amplitudes from UFO models

Template

Fortran source code and control files for event generation using MadEvent

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Source code for
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Fortran source
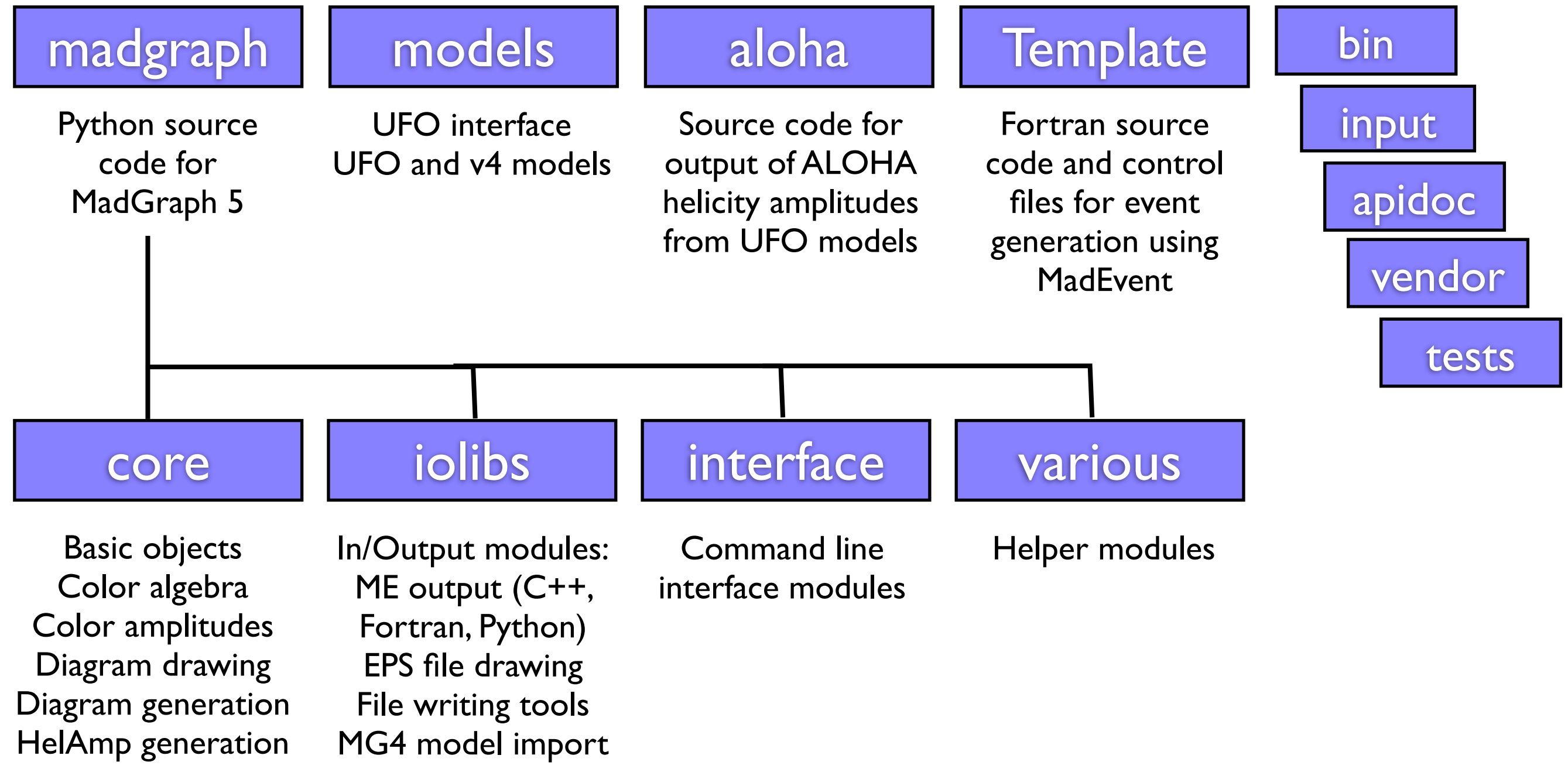code and control
files for event
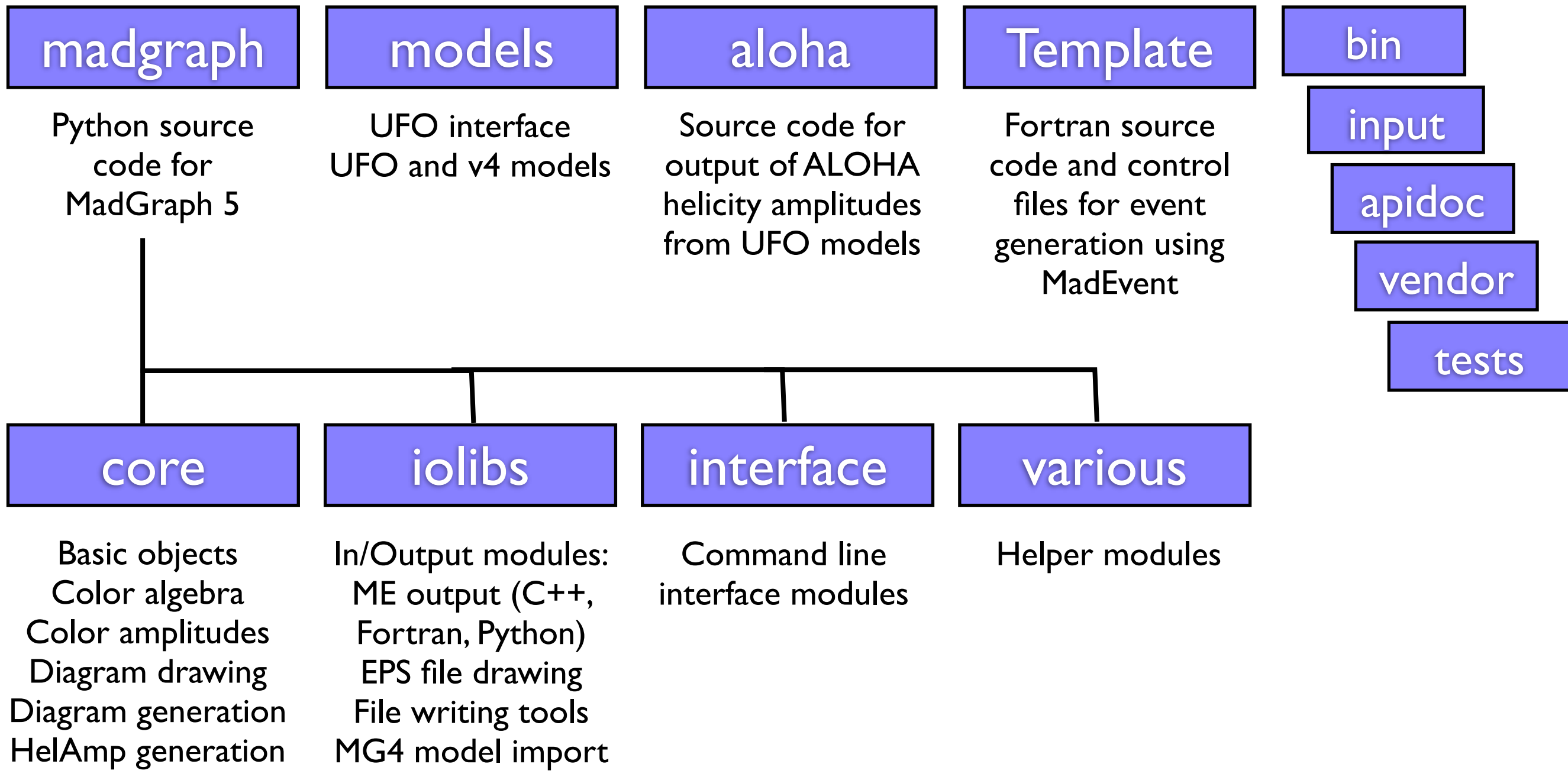generation using
MadEvent

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core

Basic objects
Color algebra
Color amplitudes
Diagram drawing
Diagram generation
HelAmp generation

iolibs

In/Output modules:
ME output (C++,
Fortran, Python)
EPS file drawing
File writing tools
MG4 model import

interface

Command line
interface modules

various

Helper modules

Structure of the code

madgraph	models	aloha	Template	bin
Python source code for MadGraph 5	UFO interface UFO and v4 models	Source code for output of ALOHA helicity amplitudes from UFO models	Fortran source code and control files for event generation using MadEvent	input

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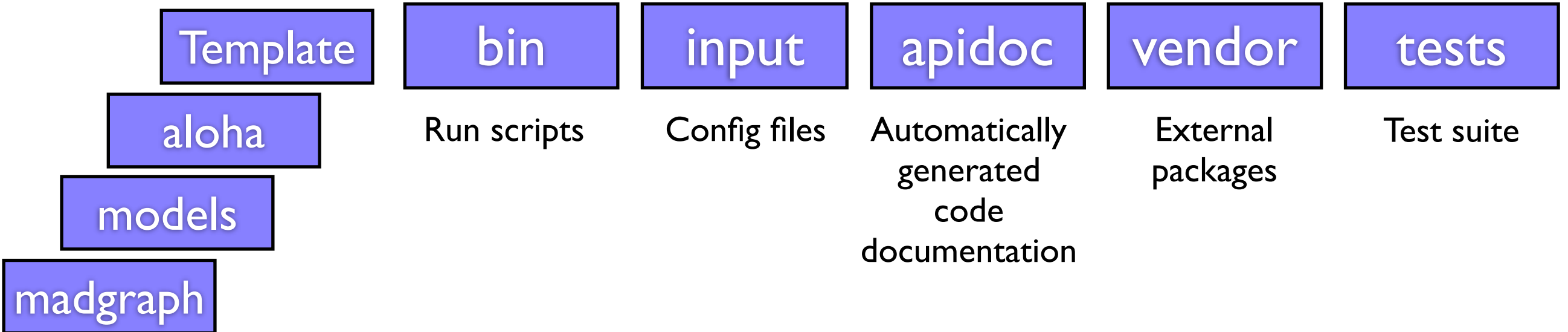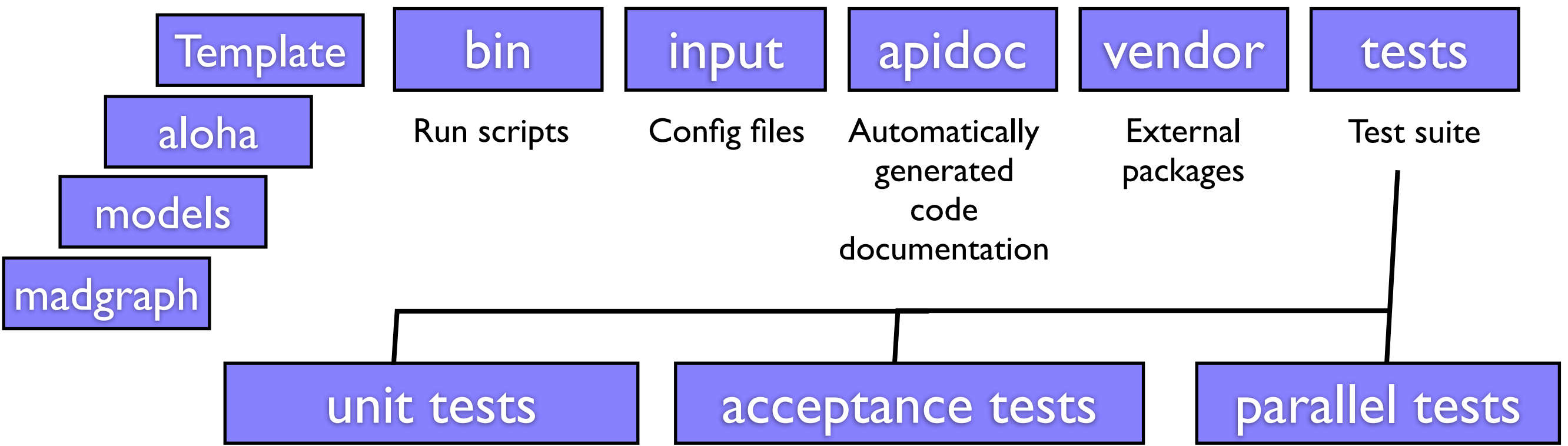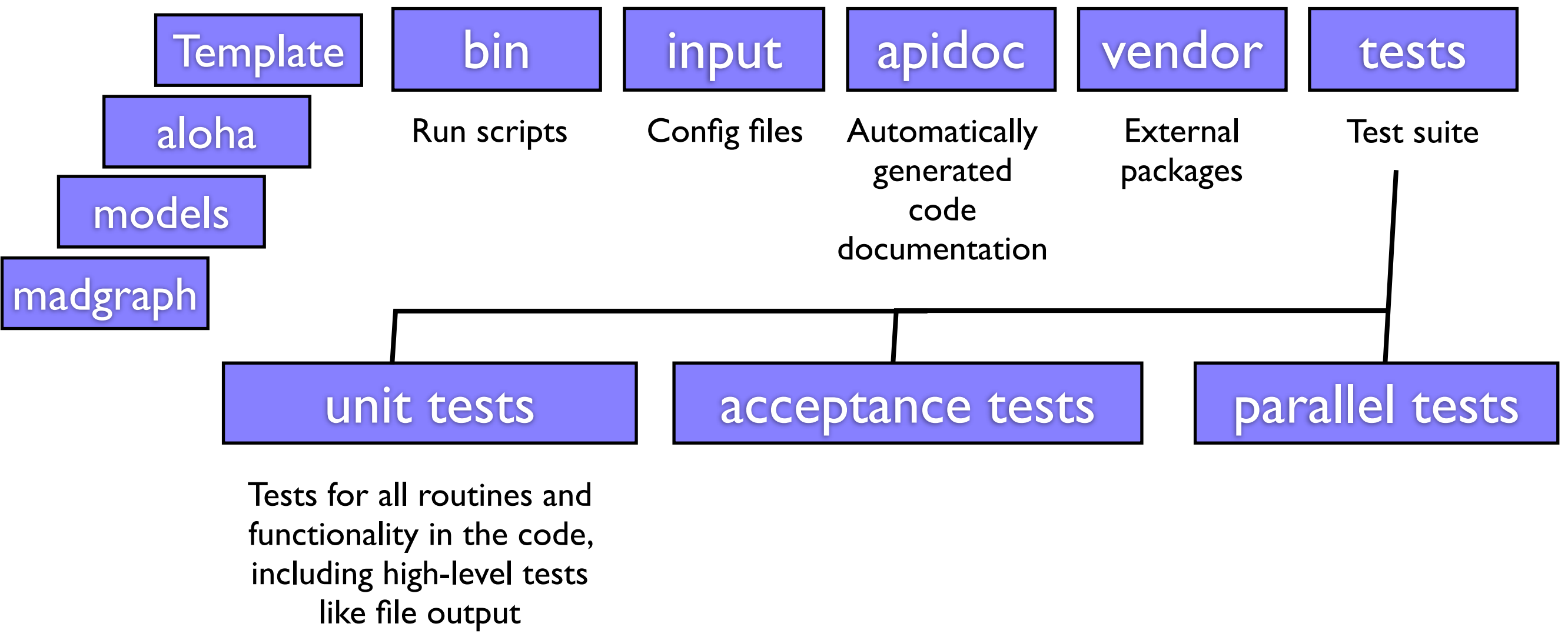| core	iolibs	interface	various
Basic objects Color algebra Color amplitudes Diagram drawing Diagram generation HelAmp generation	In/Output modules: ME output (C++, Fortran, Python) EPS file drawing File writing tools MG4 model import	Command line interface modules	Helper modules

Pick and choose functionality/plug in new modules easy!

Template

aloha
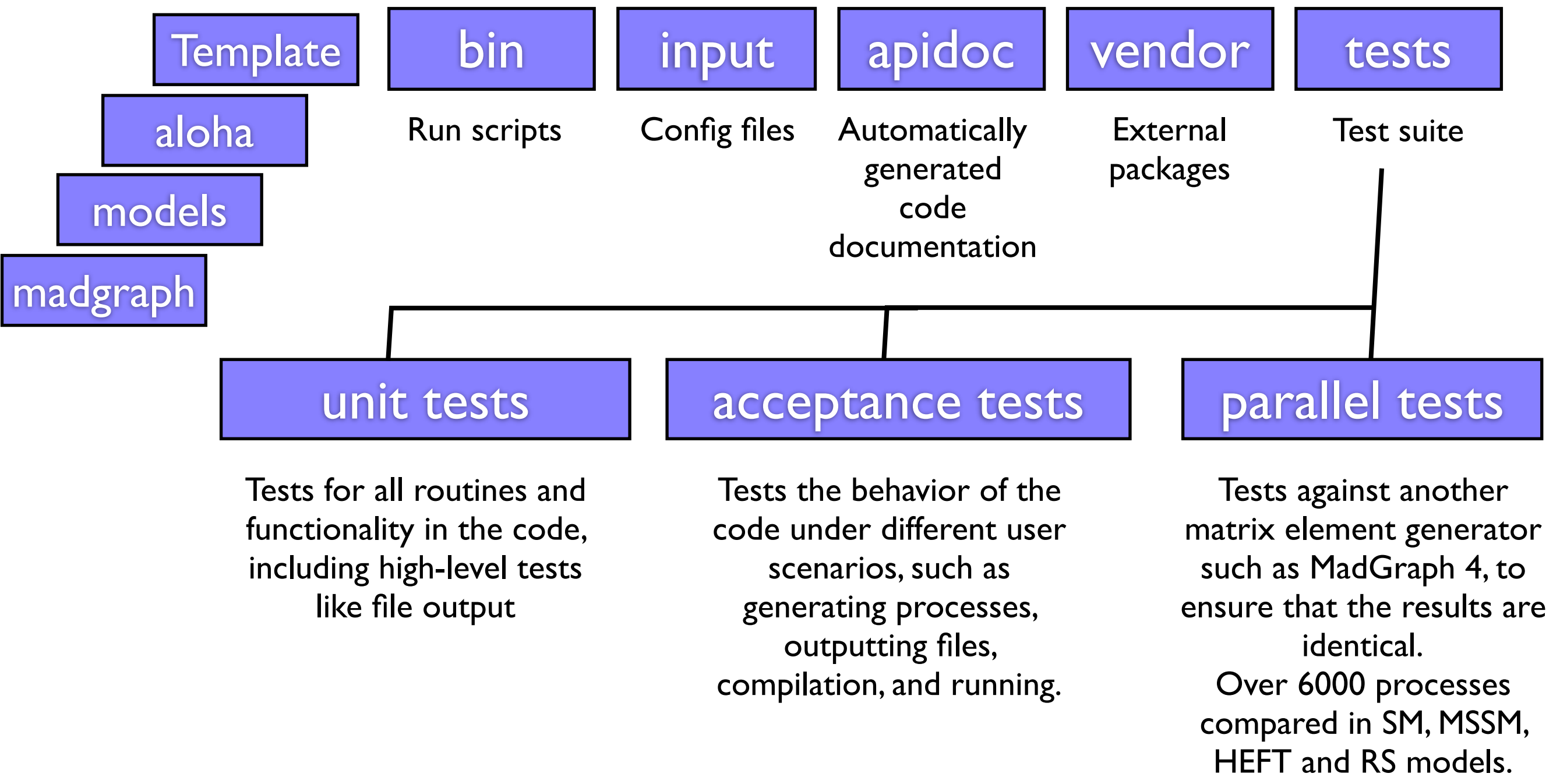
models

madgraph

bin

Run scripts

input

Config files

apidoc

Automatically generated code documentation

vendor

External packages

tests

Test suite

Structure of the code

Template

aloha

models

madgraph

bin	**input**	**apidoc**	**vendor**	**tests**
Run scripts	Config files	Automatically generated code documentation	External packages	Test suite

unit tests   **acceptance tests**   **parallel tests**

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Tests for all routines and functionality in the code, including high-level tests like file output

acceptance tests

parallel tests

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Tests against another matrix element generator such as MadGraph 4, to ensure that the results are identical.
Over 6000 processes compared in SM, MSSM, HEFT and RS models.

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But Are CRUCIAL!!

- ☐ Unit-test: Should probe each line of the code.

  - ☐ should test each function (for each input)

  - ☐ should be very fast.

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☐ acceptance-test: Checking "as a user"

If the test passes the code is supposed to be working!!!

Extreme Programming

- ☐ Modular Code highly documented

- ☐ Fast release of small implementation

- ☐ Code Review by an independant develloper

   - ☐ small review are better than big one.

- ☐ The functionality FIRST

- ☐ Think as user

- ☐ Test are part of the code (should be 50%)

Launchpad

launchpad.net | https://code.launchpad.net/madgraph5
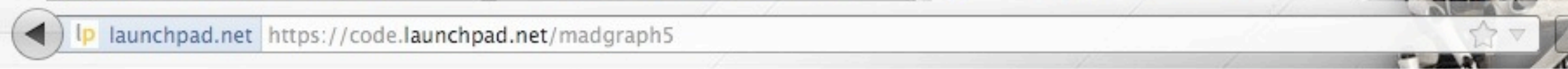
Name	Status	Last Modified	Last Commit
lp:madgraph5 **Series: trunk**	Mature	2012-05-05	211. adding model EWdim6 done by C. Degran...
lp:madgraph5/2.0 **Series: 2.0**	Experimental	2012-03-12	181. merge with 1.4.3
lp:~maddevelopers/madgraph5/FKS5	Development	10 hours ago	196. complex mass scheme is passed to the ...
lp:~maddevelopers/madgraph5/1.4.6	Development	19 hours ago	225. Fixed problem with decay chains that ...
lp:~maddevelopers/madgraph5/spin32	Development	21 hours ago	222. merge with 1.4.5
lp:~maddevelopers/madgraph5/ML5_faster	Development	2012-05-07	207. 1. Output restructured so that: a)...
lp:~maddevelopers/madgraph5/madweight	Development	2012-05-07	207. tt~ bar semileptonic was broken becau...
lp:~maddevelopers/madgraph5/FKS5_new_born_ko	Development	2012-05-07	253. working on an imporving of the madfks...
lp:~maddevelopers/madgraph5/WWW	Development	2012-05-05	11. find a way to have it working on both...
lp:~maddevelopers/madgraph5/faster_aloha	Development	2012-05-04	241. progress on the structure of the writ...
lp:~maddevelopers/madgraph5/FKS5_new_born	Development	2012-05-04	252. added reweightNLO.inc to the linked f...

bzr / launchpad

- We use bazaar to save progress and be able to merge easily our work

  - merge often (less conflicts and easier to solve)

- We use Launchpad to organize our work

  - serve as communication tools

  - include review

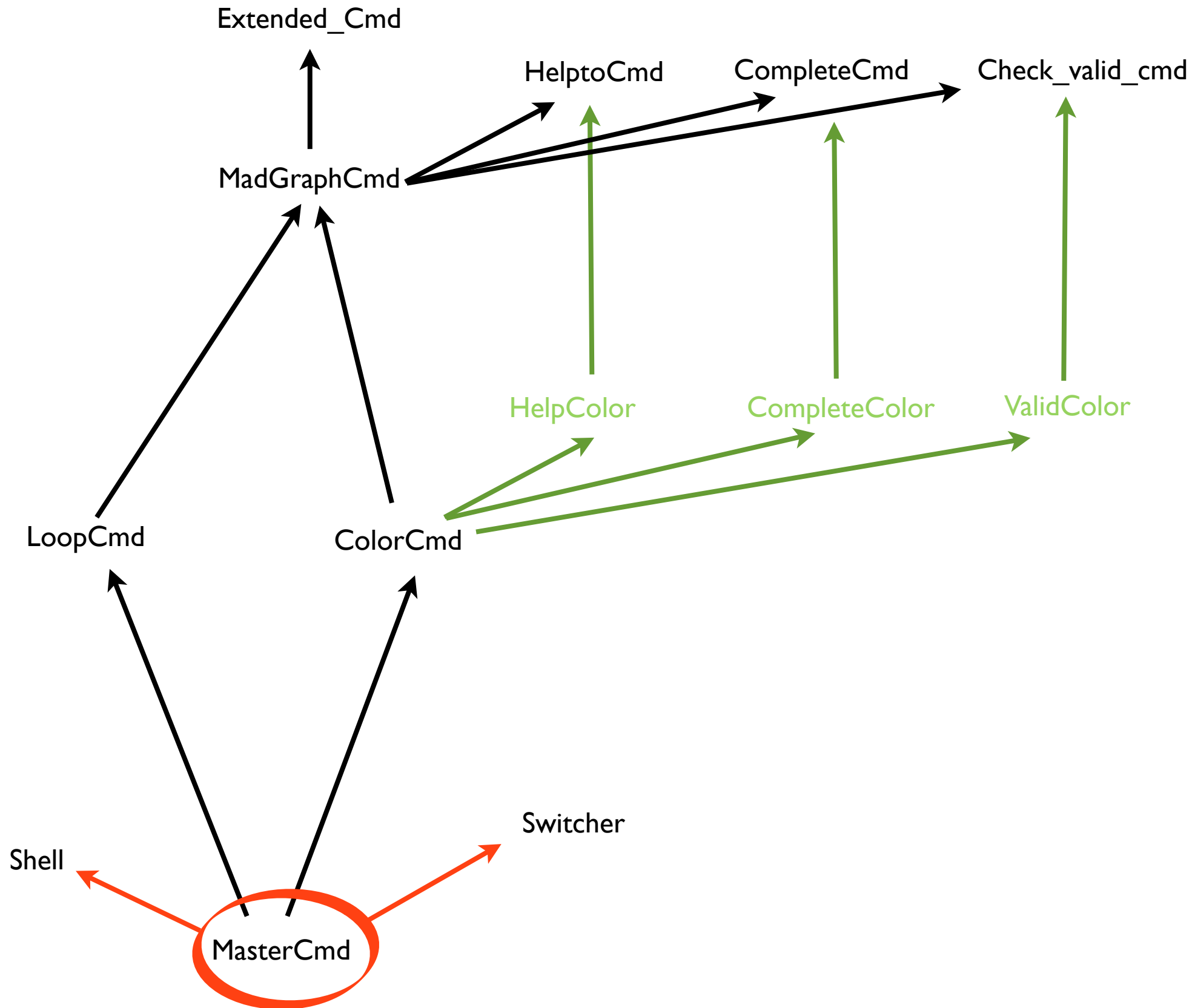 - Please subscribe to the group maddevelopers

Trick / Good policy

☐ PEP 08

☐ do auto-completion/help right away!

☐ We have a command "ask" which also allow auto-completion

☐ usefull functions in

    ☐ various/misc.py

    ☐ iolibs/files.py

☐ Do not repeat your-self (or the work of someone else)
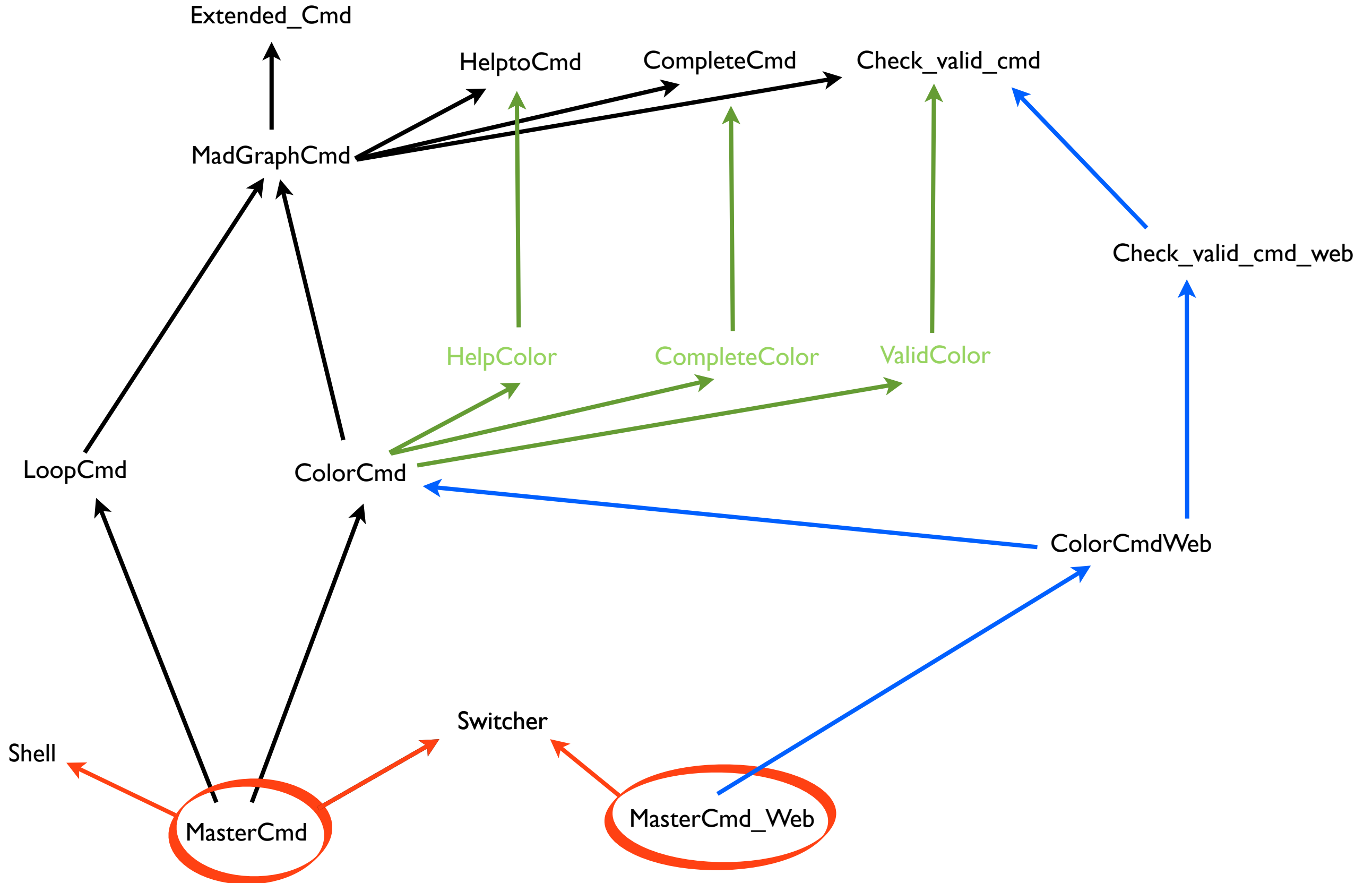
2.0 class map

Extended_Cmd

HelptoCmd   CompleteCmd   Check_valid_cmd

MadGraphCmd

LoopCmd   ColorCmd

Shell   Switcher

MasterCmd

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MadGraphCmd

HelpColor   CompleteColor   ValidColor

LoopCmd   ColorCmd

Shell   Switcher

MasterCmd
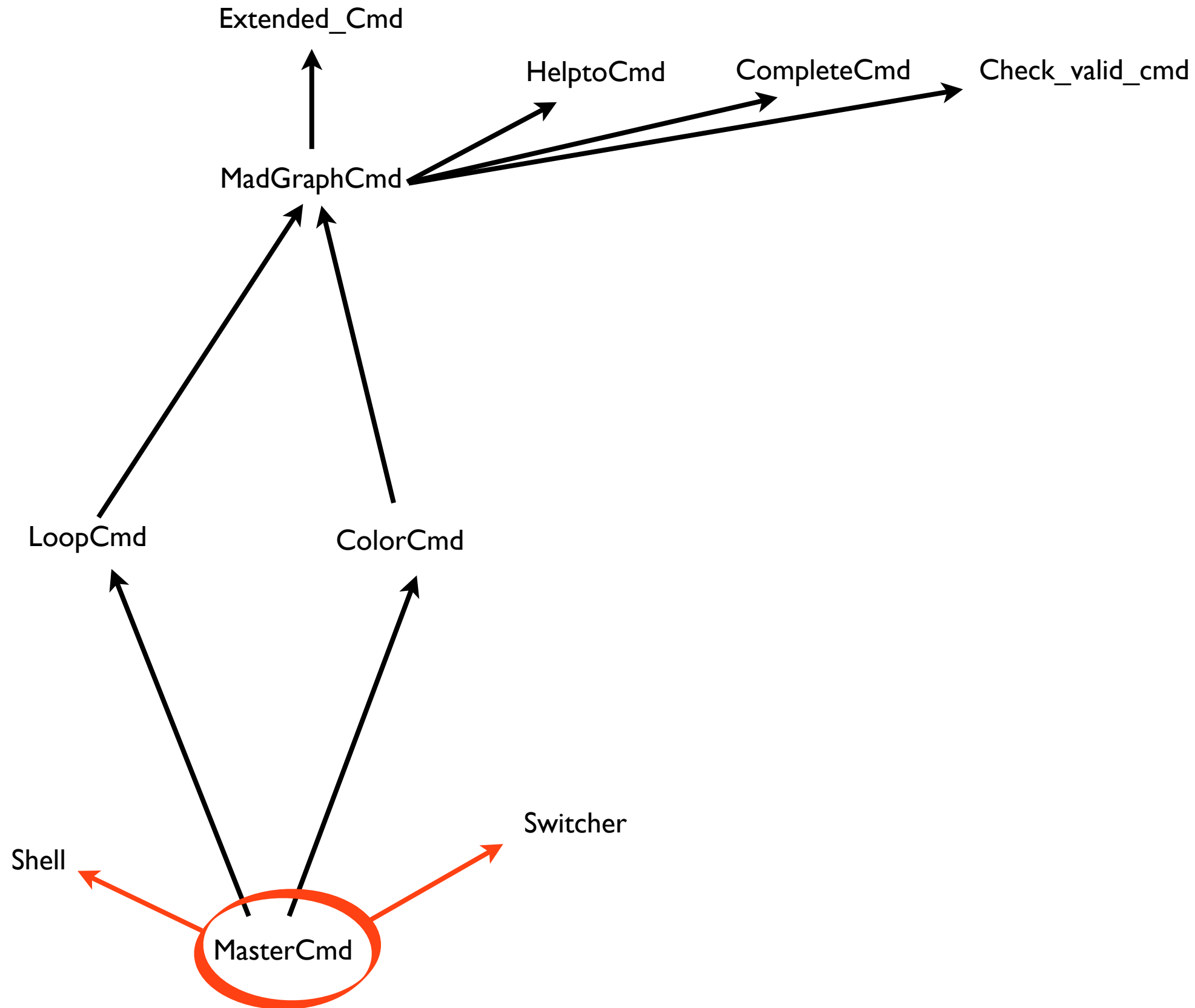
2.0 class map

☐ Make Tests

☐ Use BZR/ Launchpad

☐ Have FUN with Madgraph5!!!!

☐ We are glad to have many developers and many projects moving forward!