SCSCP and OpenMath

(and OpenDreamKit)

Markus Pfeiffer and Alexander Konovalov

University of
St Andrews

markus.pfeiffer@st-andrews.ac.uk

alexander.konovalov@st-andrews.ac.uk

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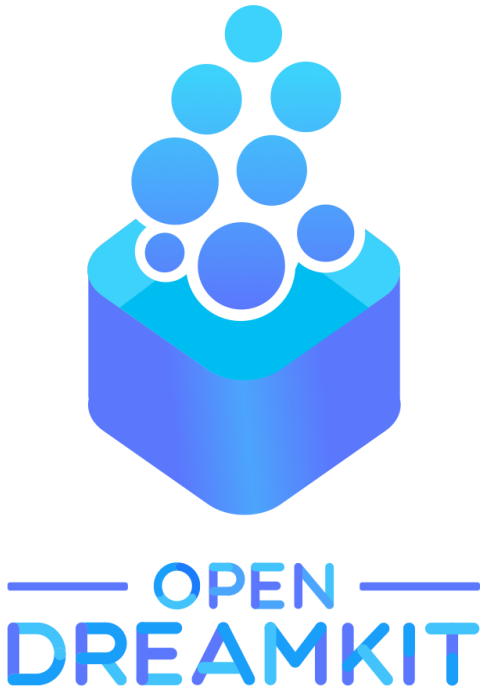
OpenDreamKit
A project funded by the Horizon 2020 - European Research Infrastructures Work Programme



http://opendreamkit.org

OpenDreamKit

- a "Virtual Research Environment" for mathematics

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- for example GAP, Sage, Singular, Jupyter, Pari/GP, etc...
- and preceding composition efforts: OpenMath, SCSCP, etc.

Challenge: Interfacing

- (sometimes subtly) different assumptions and implementations

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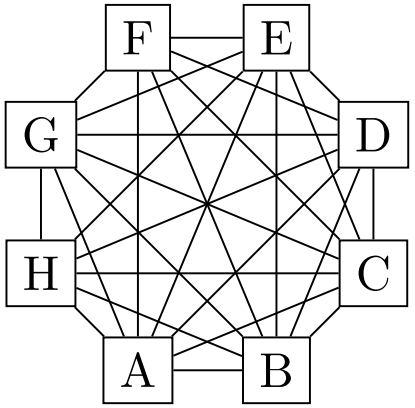
- (sometimes subtly) different assumptions and implementations
- hand-crafted interfaces
- error prone
- requires understanding of at least two systems

Interfacing

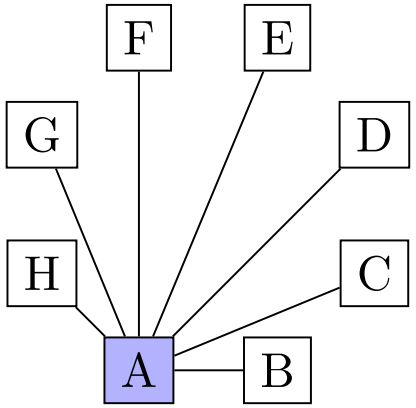
Option 1: Peer-to-Peer



n^2 / 2 translations

Interfacing

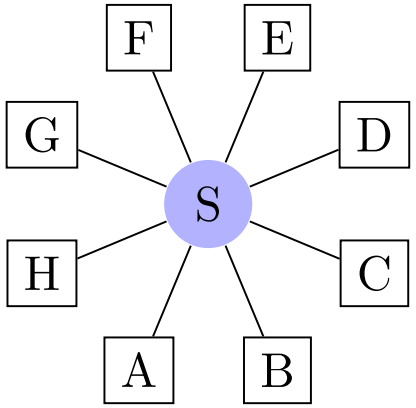
Option 2: Industry Standard



2n - n translations

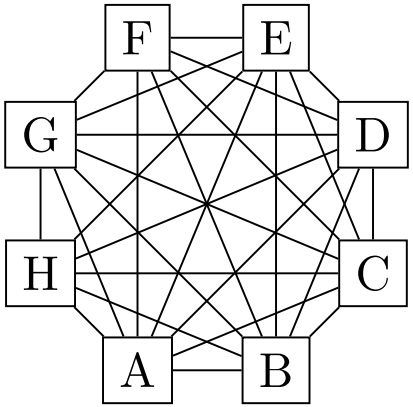
Interfacing

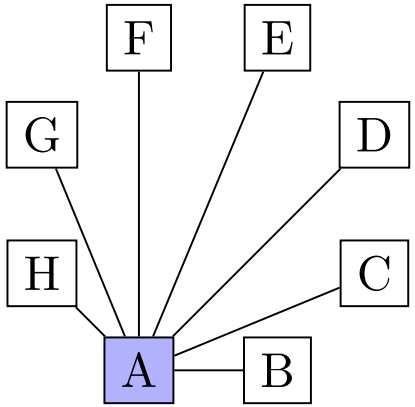
Option 3: Open Standard

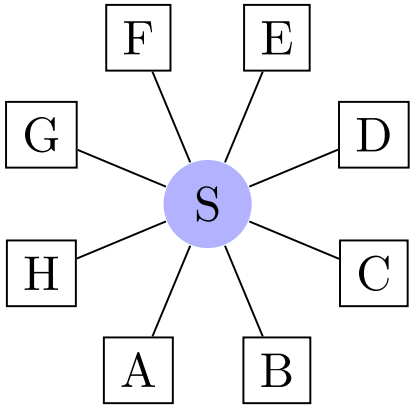


2n translations

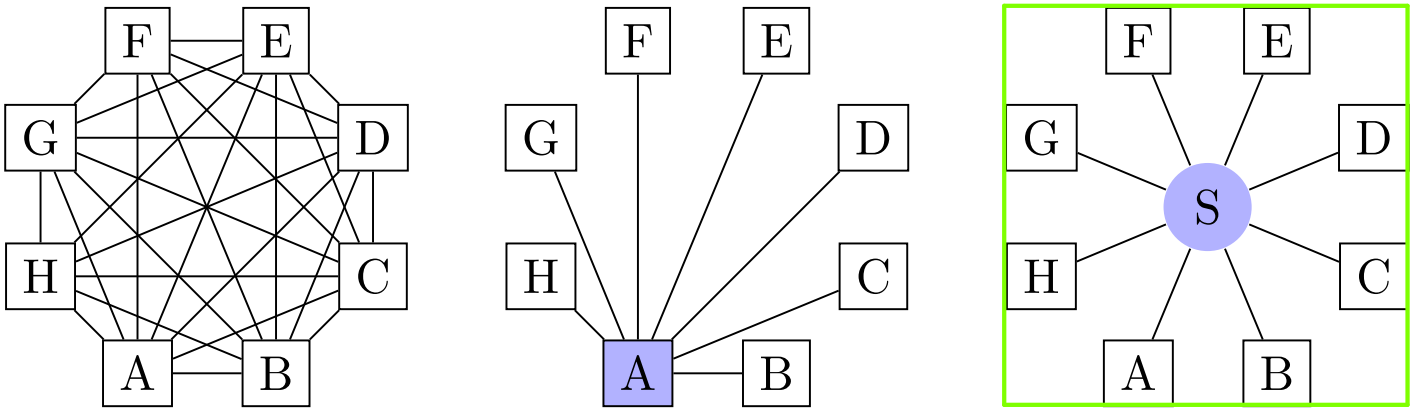
Interfacing





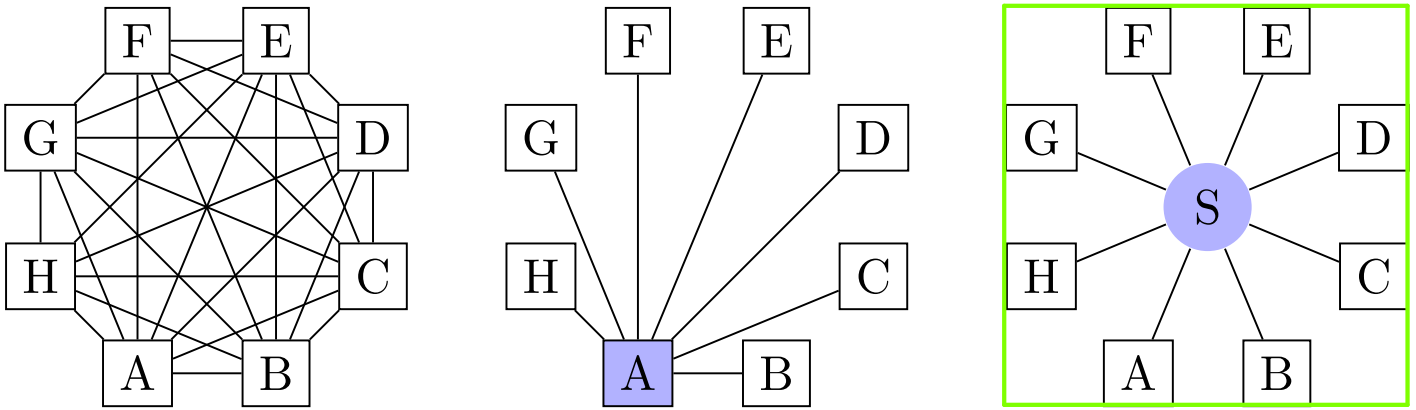


Interfacing



Let's establish Option 3

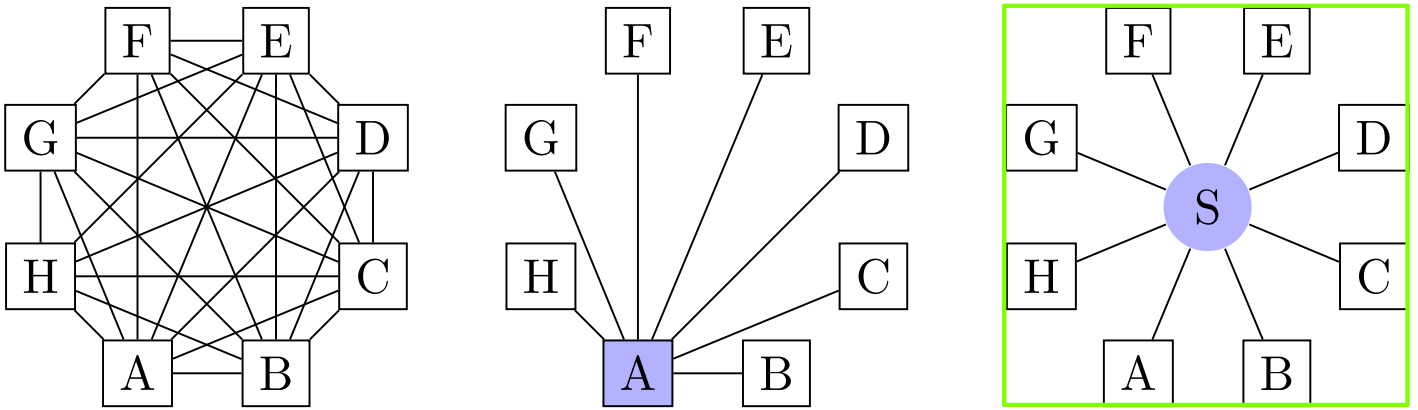
Interfacing



Let's establish Option 3

With OpenMath, SCSCP, and MMT

Interfacing



Let's establish Option 3

With OpenMath, SCSCP, and MMT

Call it "Math in the Middle"

OpenMath

OpenMath is an emerging standard for representing mathematical objects with their semantics, allowing them to be exchanged between computer programs, stored in databases, or published on the worldwide web.

SCSCP

- Symbolic Computation Software Composability Protocol
- Specified in OpenMath CDs *scscp1* and *scscp2*
- Simple RPC protocol
  - **`procedure_call`**
  - **`procedure_completed`**
  - **`procedure_terminated`**

GAP

- GAP **http://www.gap-system.org**
- Programming Language
- Computer Algebra System
- Library of Mathematical Functionality
- Group Theory
- Data Libraries
- Packages

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GAP

- Importantly: OpenMath & SCSCP Packages
- OpenMath CDs that cover some basic data + Conversion

Interfacing with GAP; The plan

- Step 1: Export Type Information from GAP
- Step 2: Generate CDs
- Step 3: Formalise Group Theory in MMT, bootstrap MitM
- Step 4: Align GAP with formalisation
- Step 5: Formalise some Rings and Ideals in MMT
- Step 6: Align Singular with formalisation
- Step 7: Successful Demonstration of MitM

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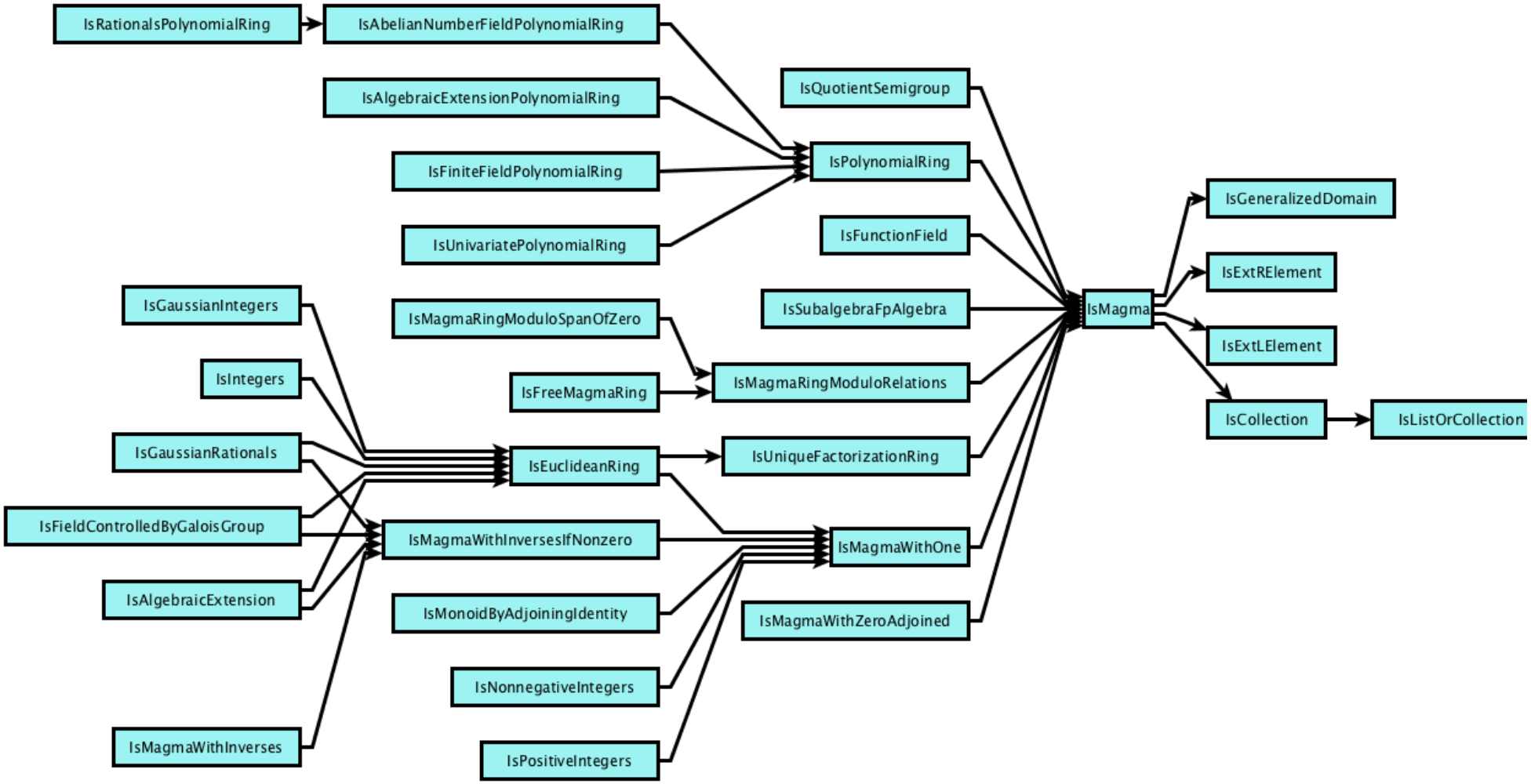
IsMagma in GAP



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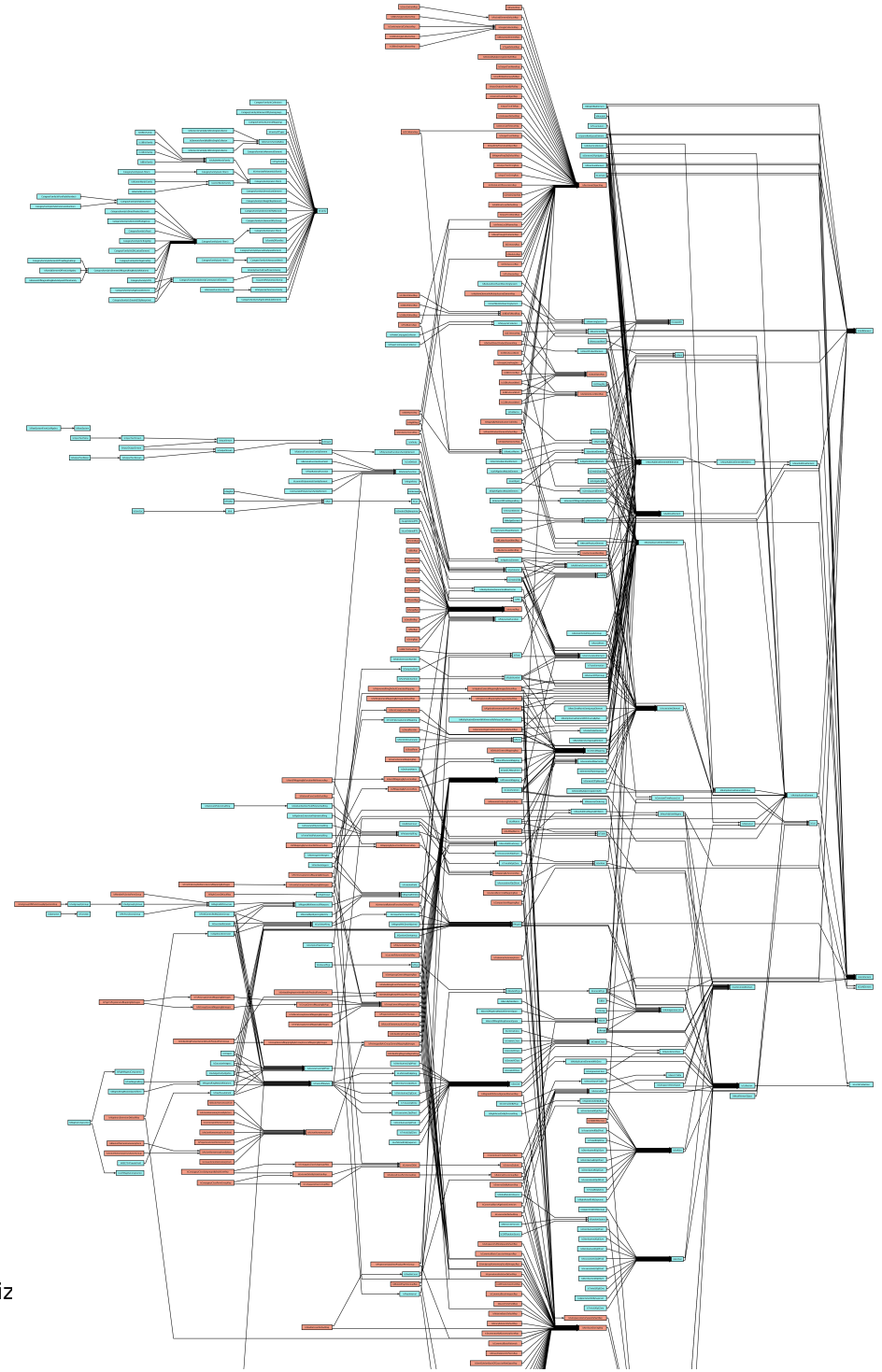

Questions? / Discussion