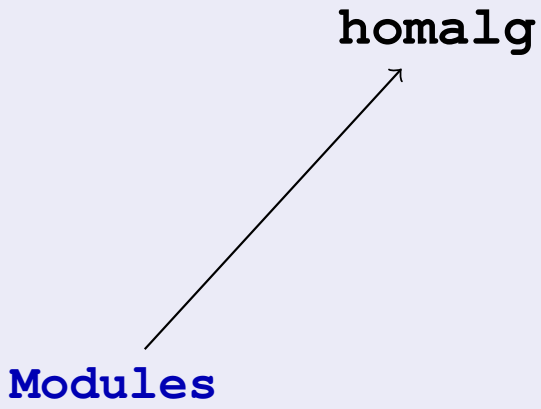
The homalg project and its related packages

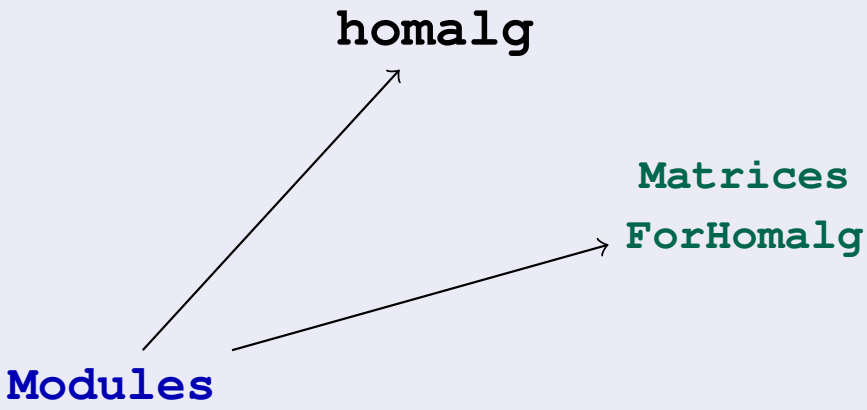
The homalg project authors

2007-2012

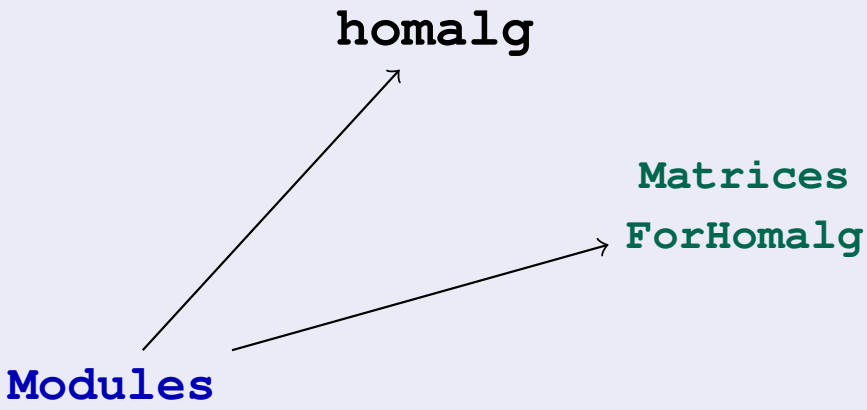
homalg


homalg
Modules

Matrices provide the needed data structure for finitely presented modules and their morphisms

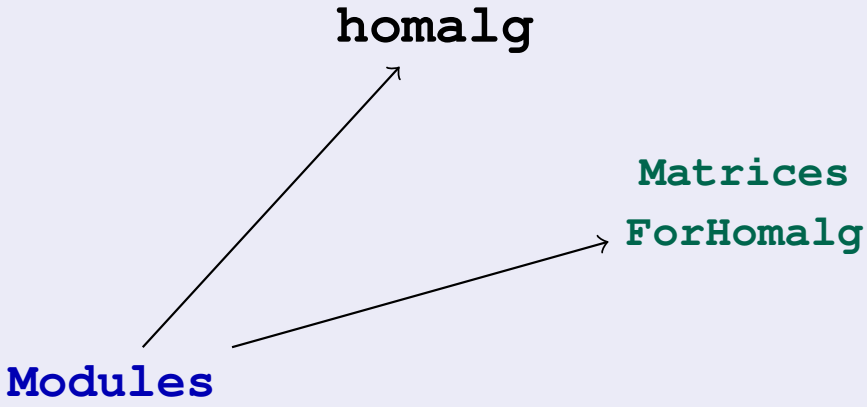


Candidates: There are several systems that could host `homalg`

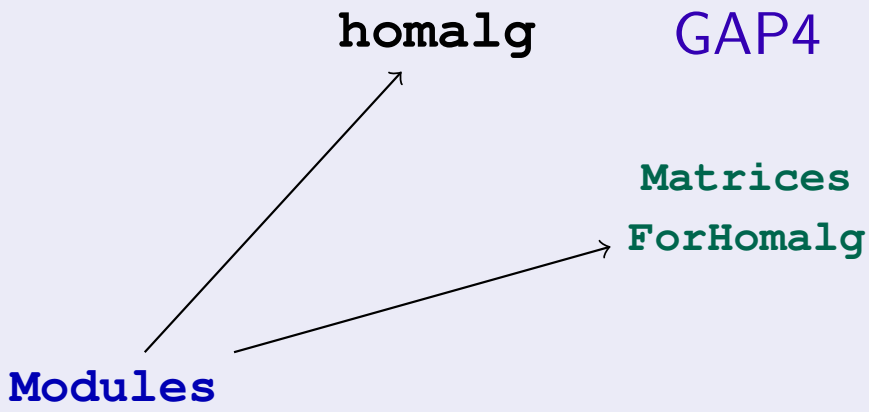


Maple MAGMA Macaulay2 Sage GAP SINGULAR

Candidates: There are several systems that could host `homalg`, each supporting certain kinds of rings



Maple	MAGMA	Macaulay2	Sage	GAP	SINGULAR
$\Downarrow$	$\Downarrow$	$\Downarrow$	$\Downarrow$	$\Downarrow$	$\Downarrow$
$\mathbb{Z}[x,\partial]$, $\ldots$	$\mathbb{Z}[x]$, $\mathbb{F}[x]$	$\mathbb{F}[x]$, $\mathbb{F}[x,\partial]$, $\ldots$	$\mathbb{Z}$, $\ldots$	$\mathbb{Z}$	$\mathbb{F}[x]$, $\mathbb{F}[x,\partial]$, $\ldots$



Maple	MAGMA	Macaulay2	Sage	GAP	SINGULAR
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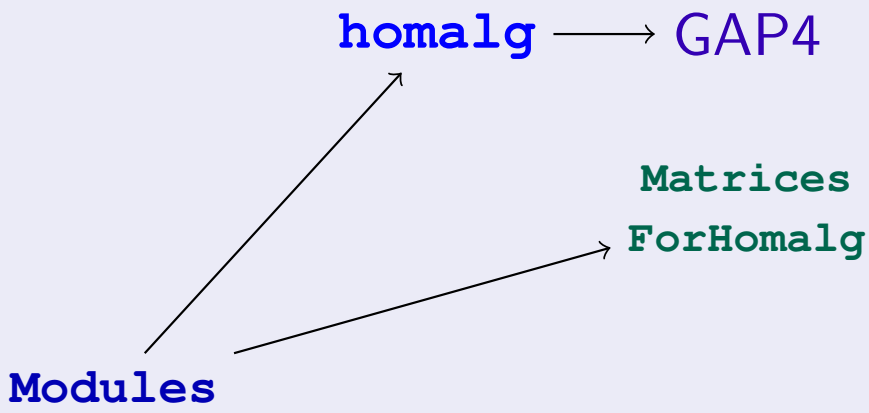

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$\mathbb{Z}[x]$, $\mathbb{F}[x]$

Macaulay2
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Sage
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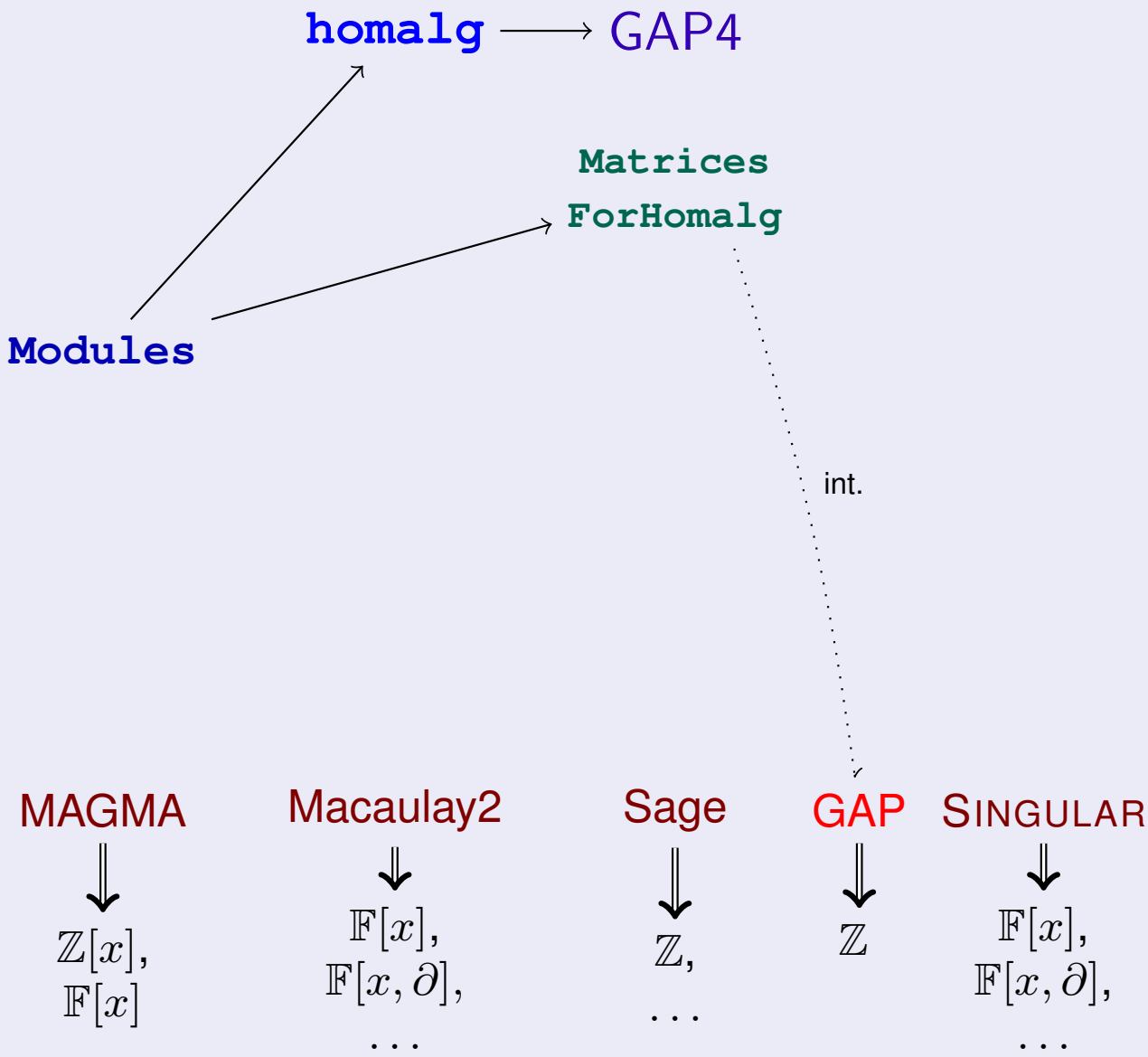
$\mathbb{F}[x]$, $\mathbb{F}[x, \partial]$, ...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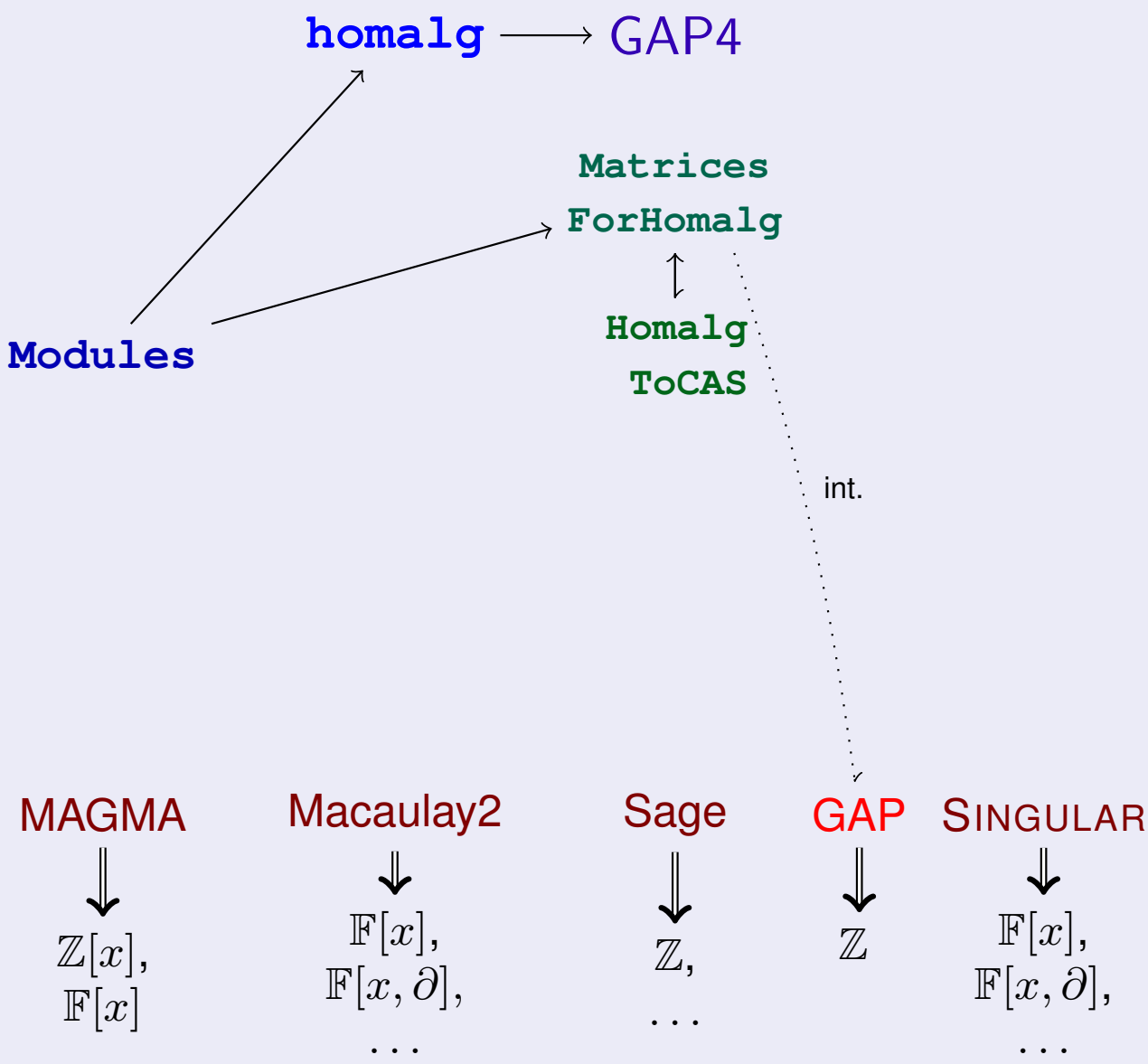
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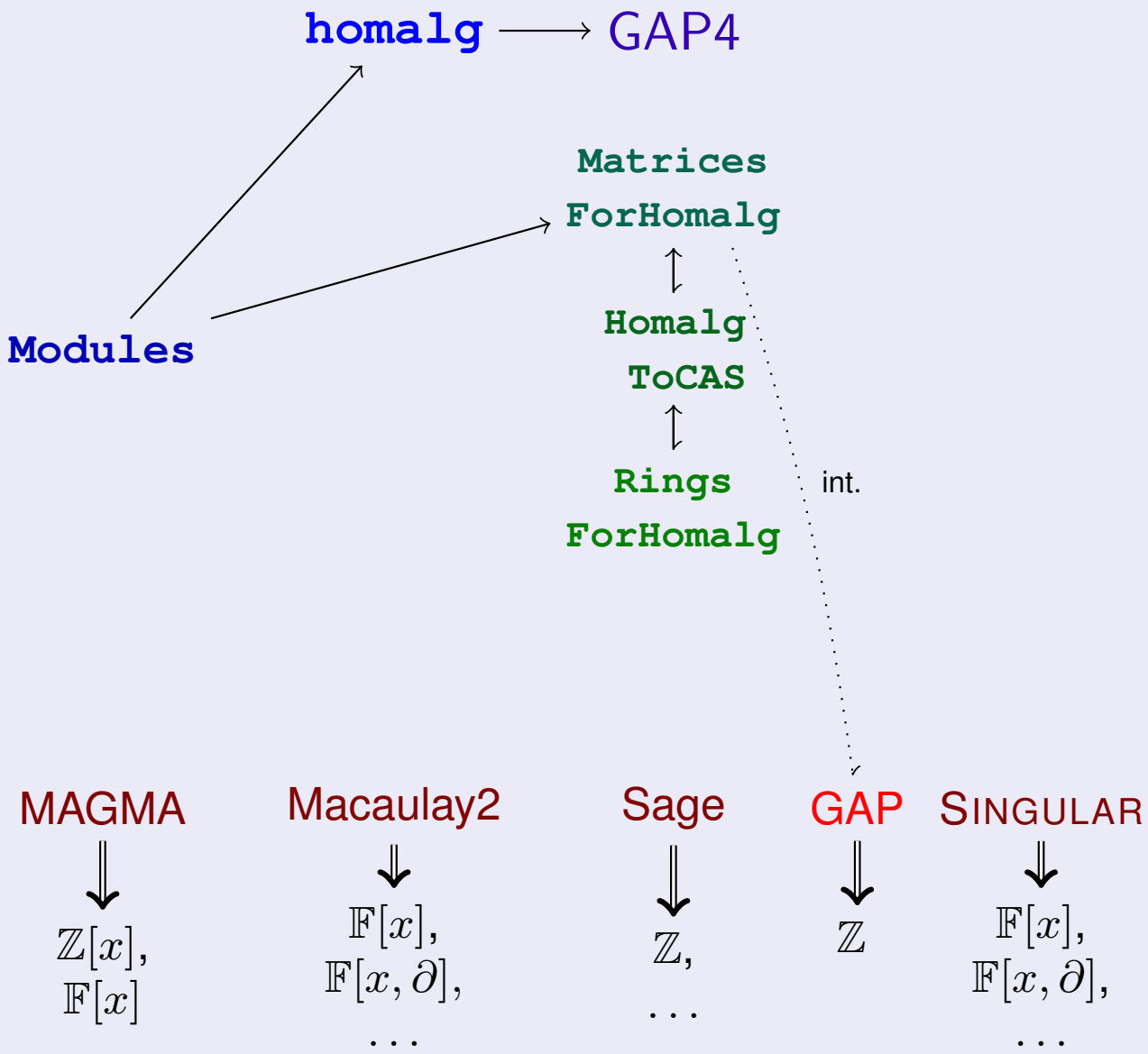
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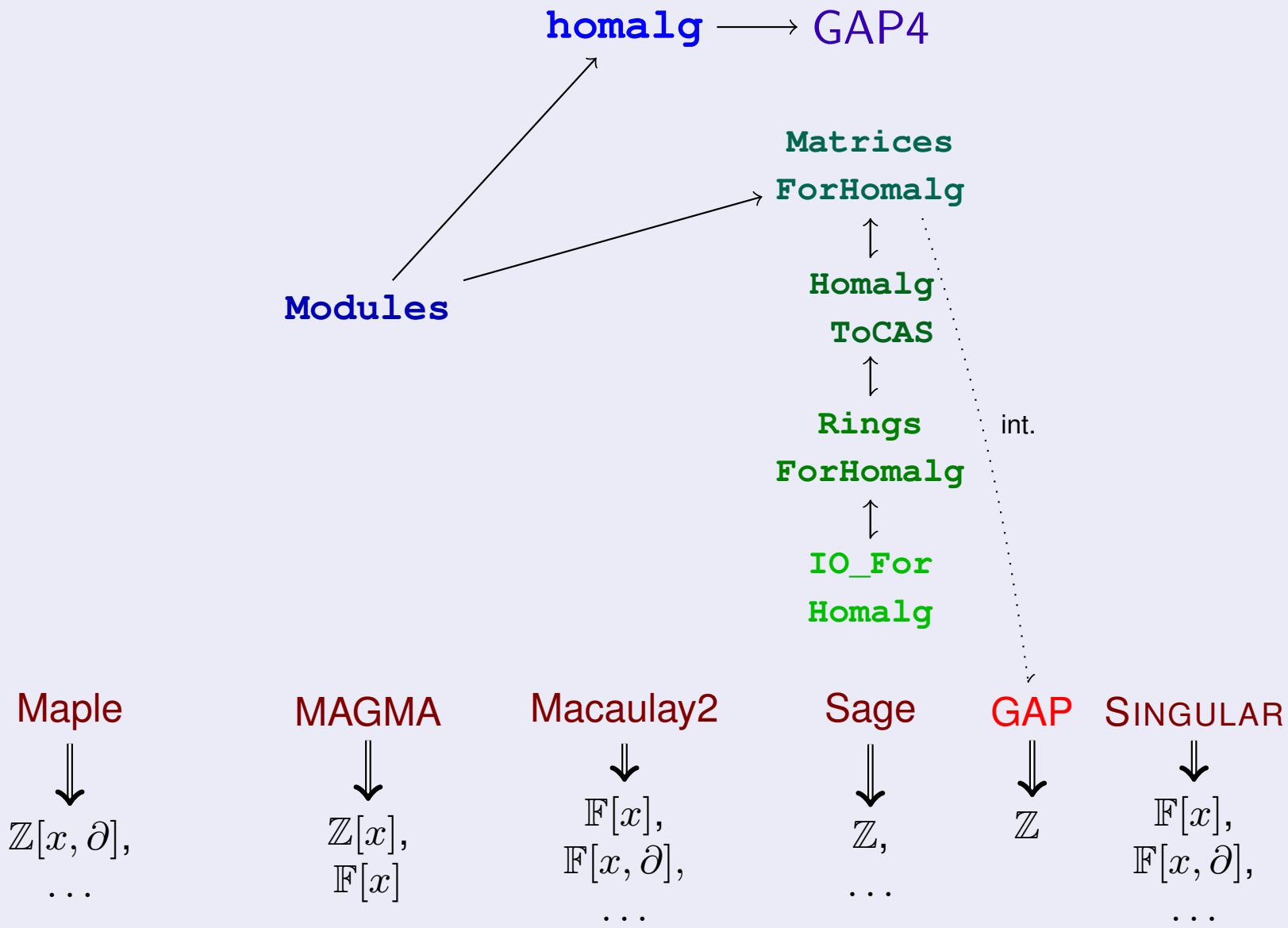
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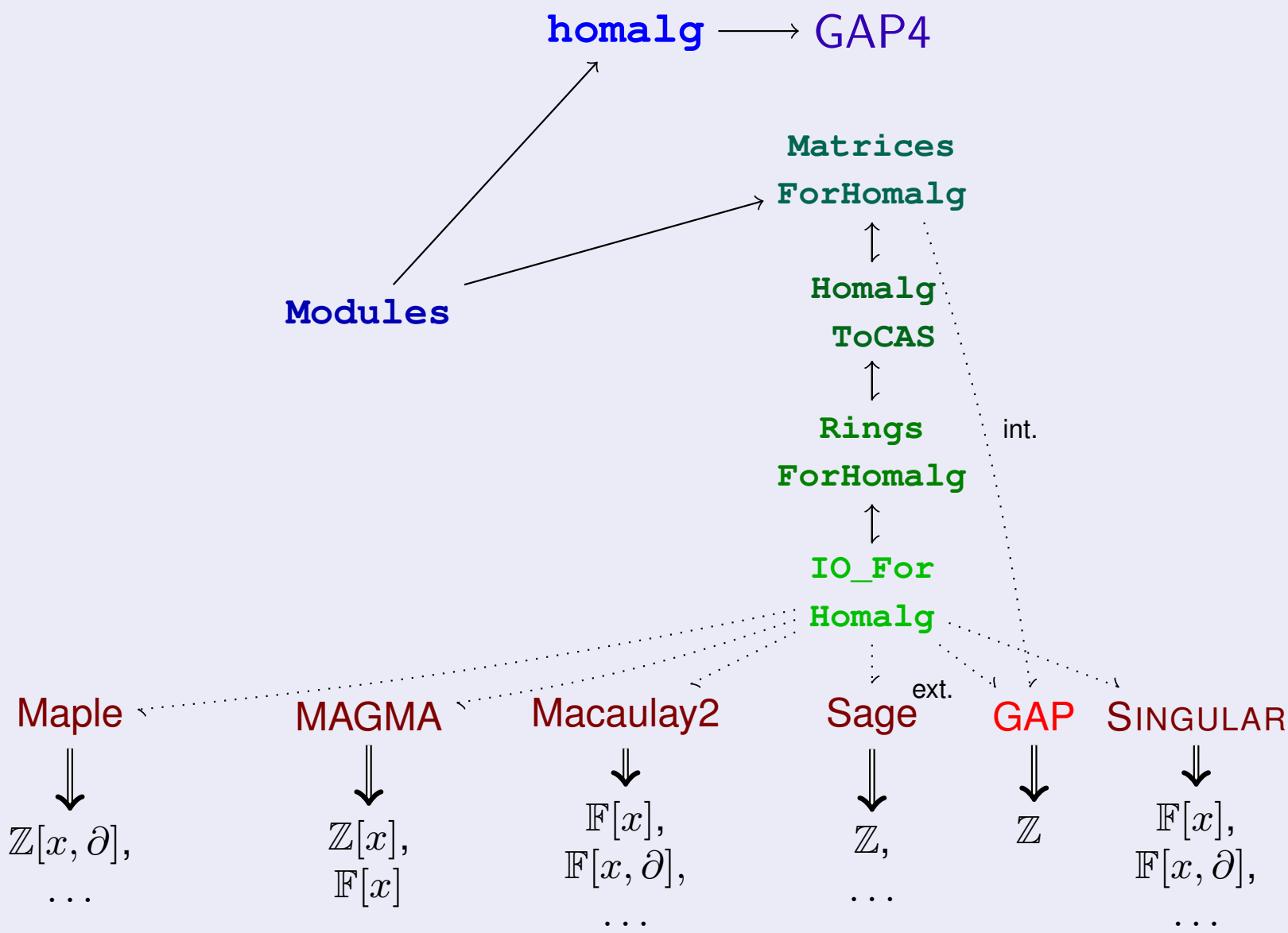
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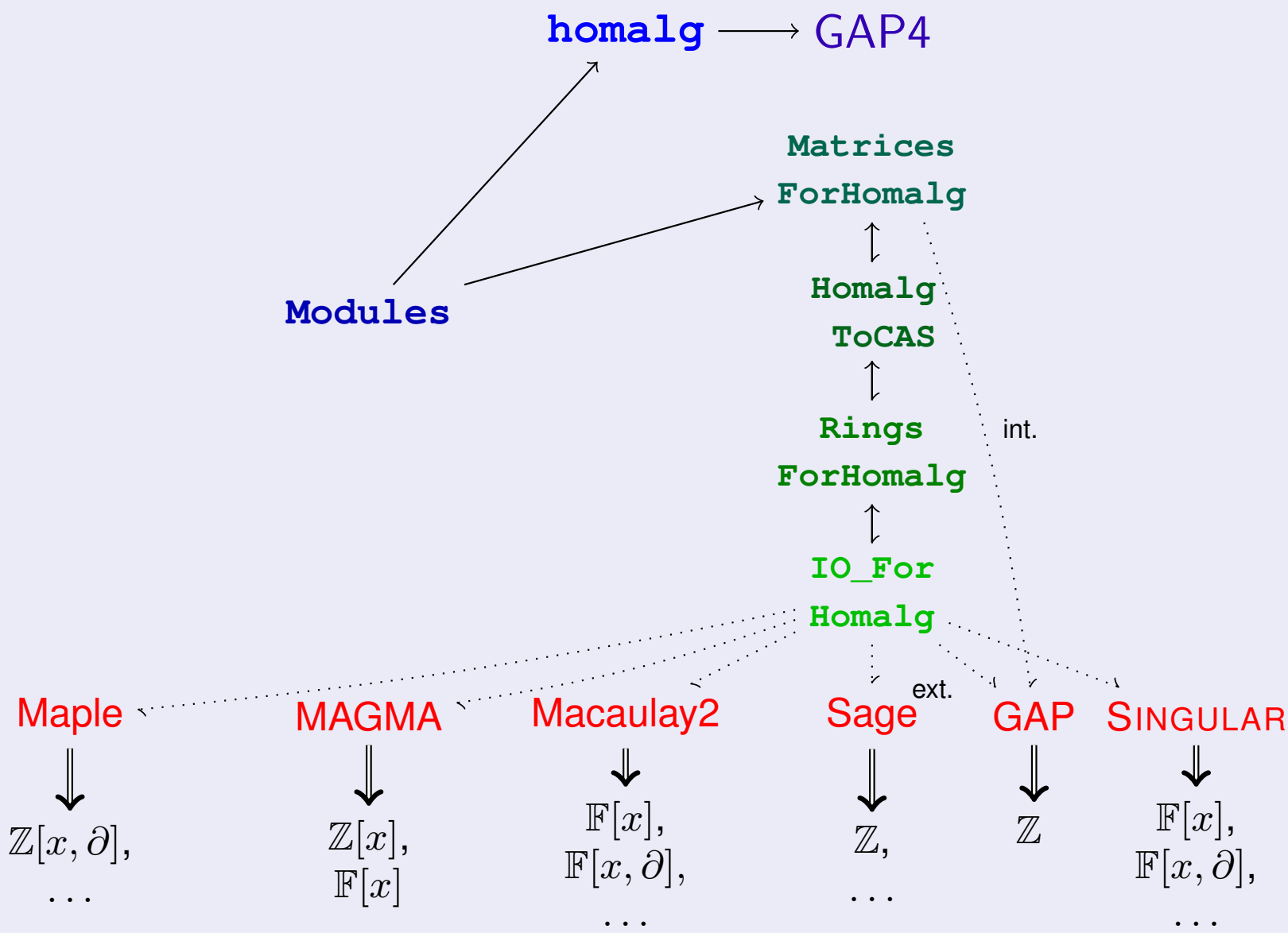
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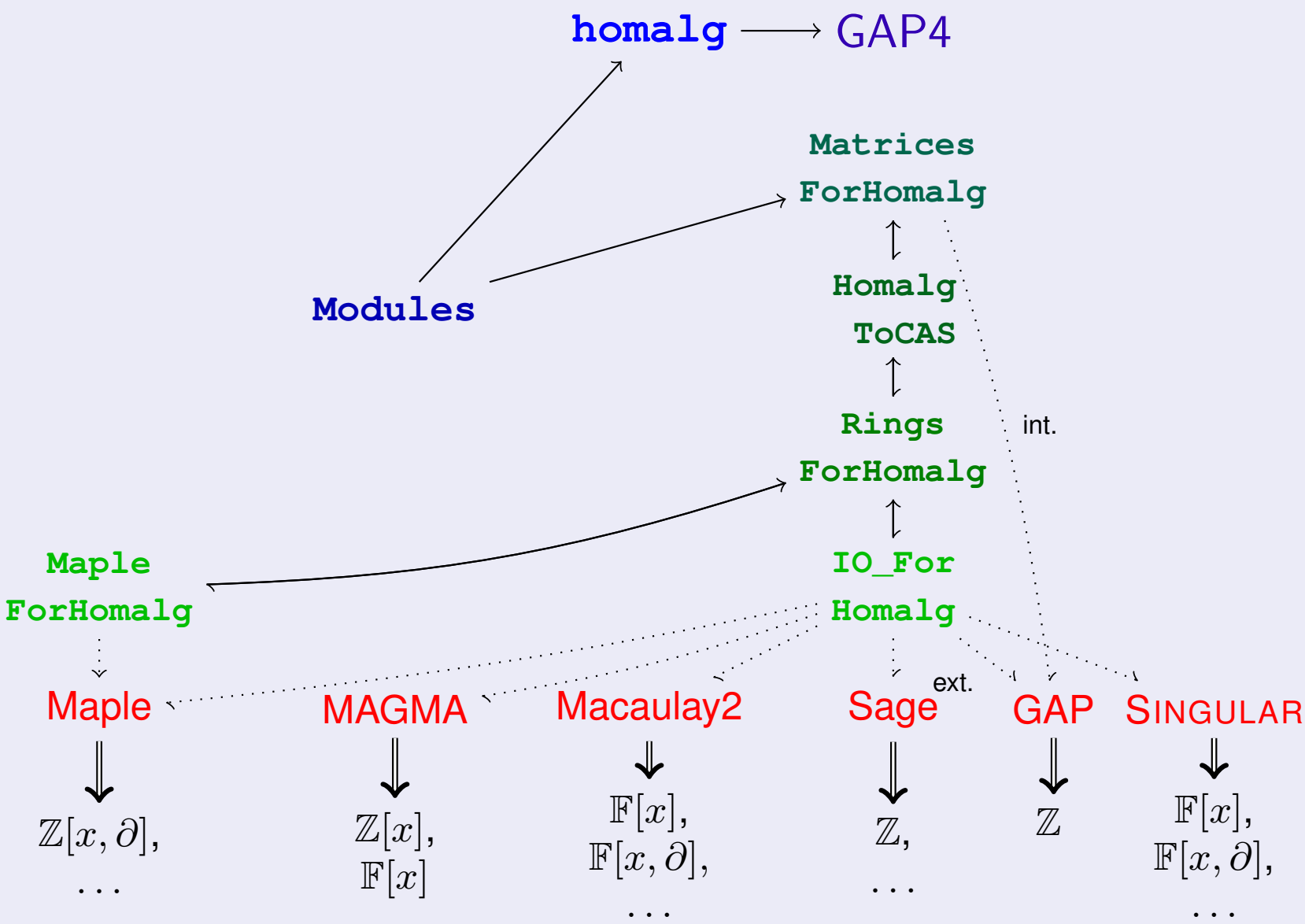
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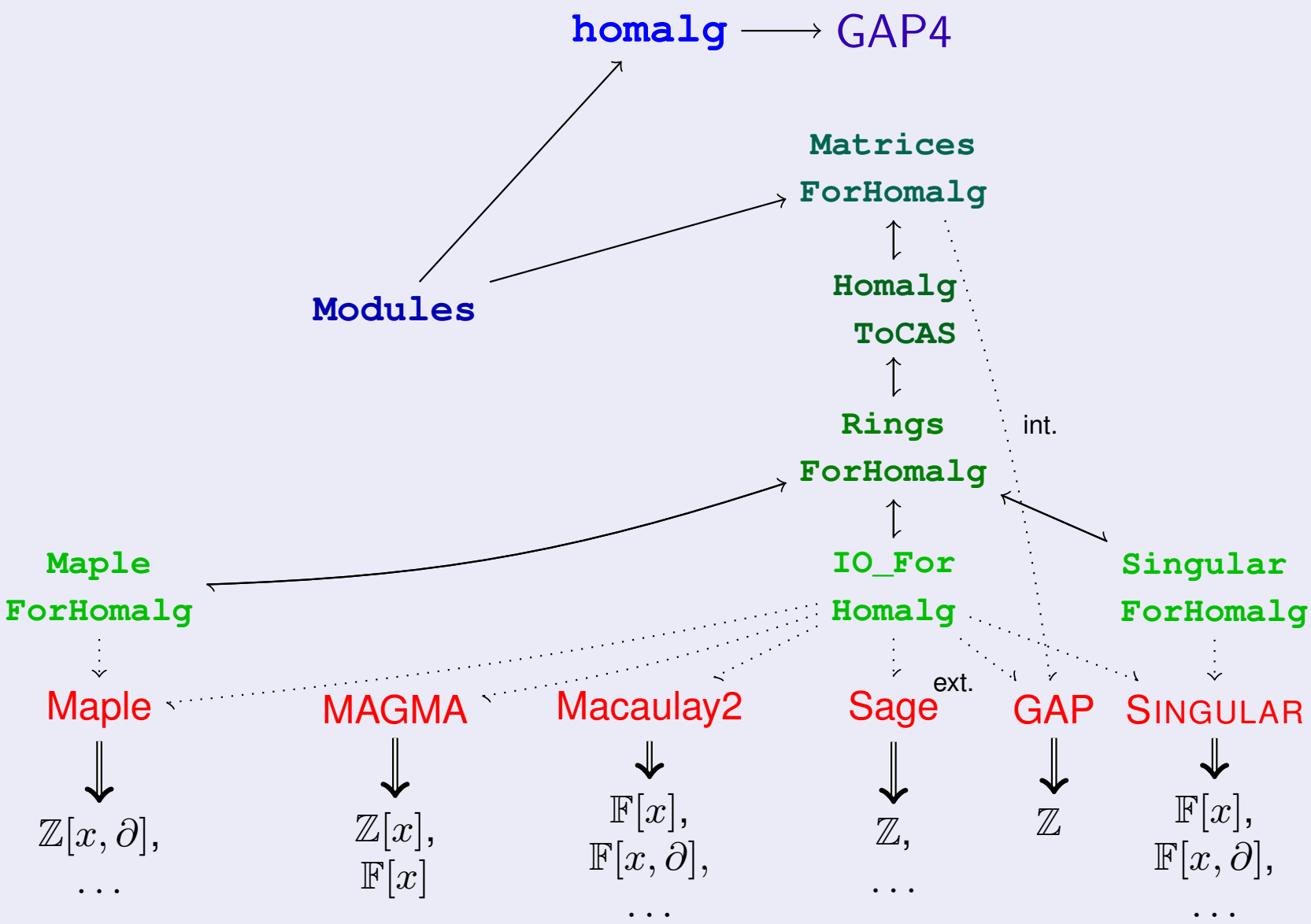
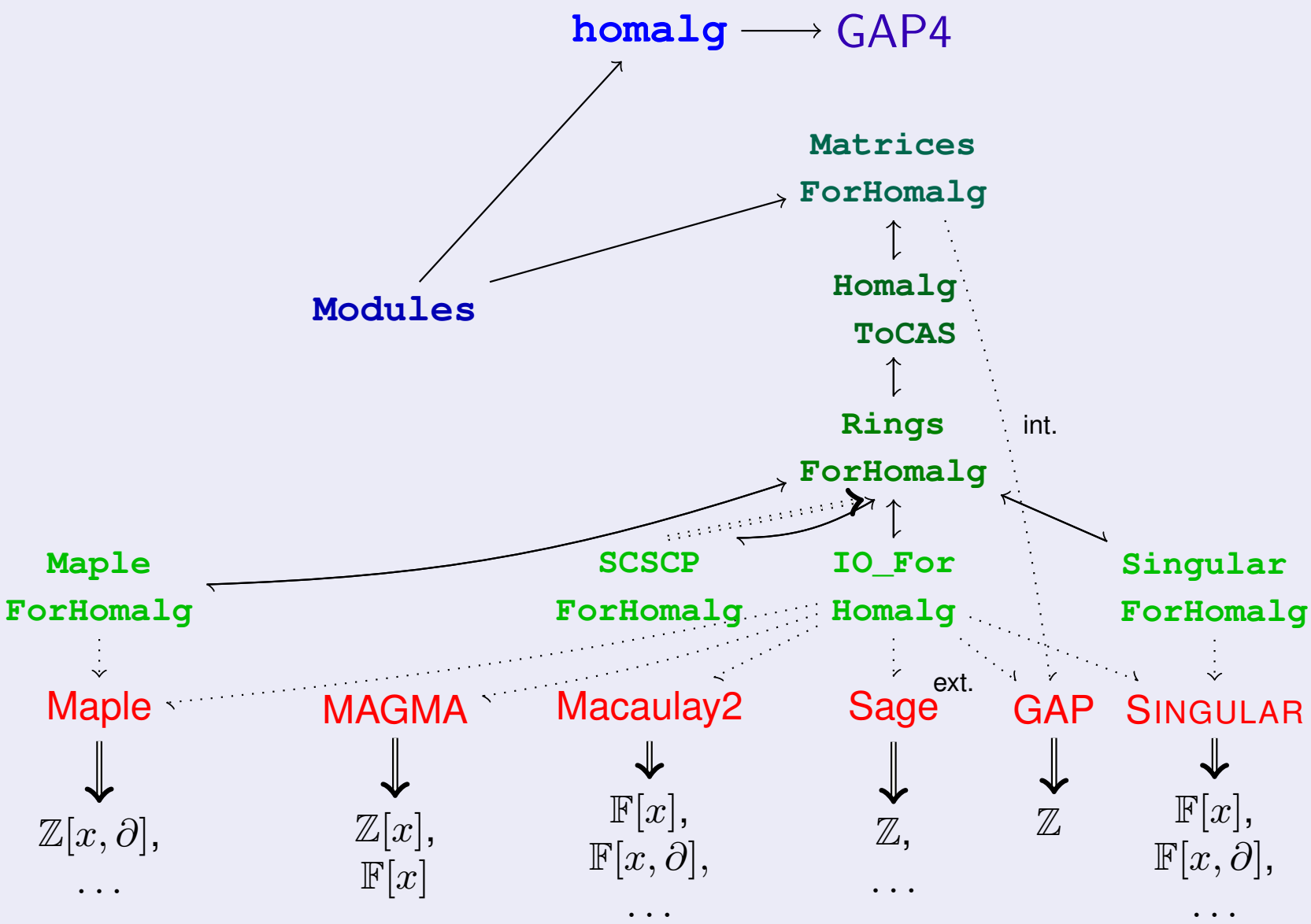
Future: Communicate with interpreters of various CASs shortcutting their command line interface.

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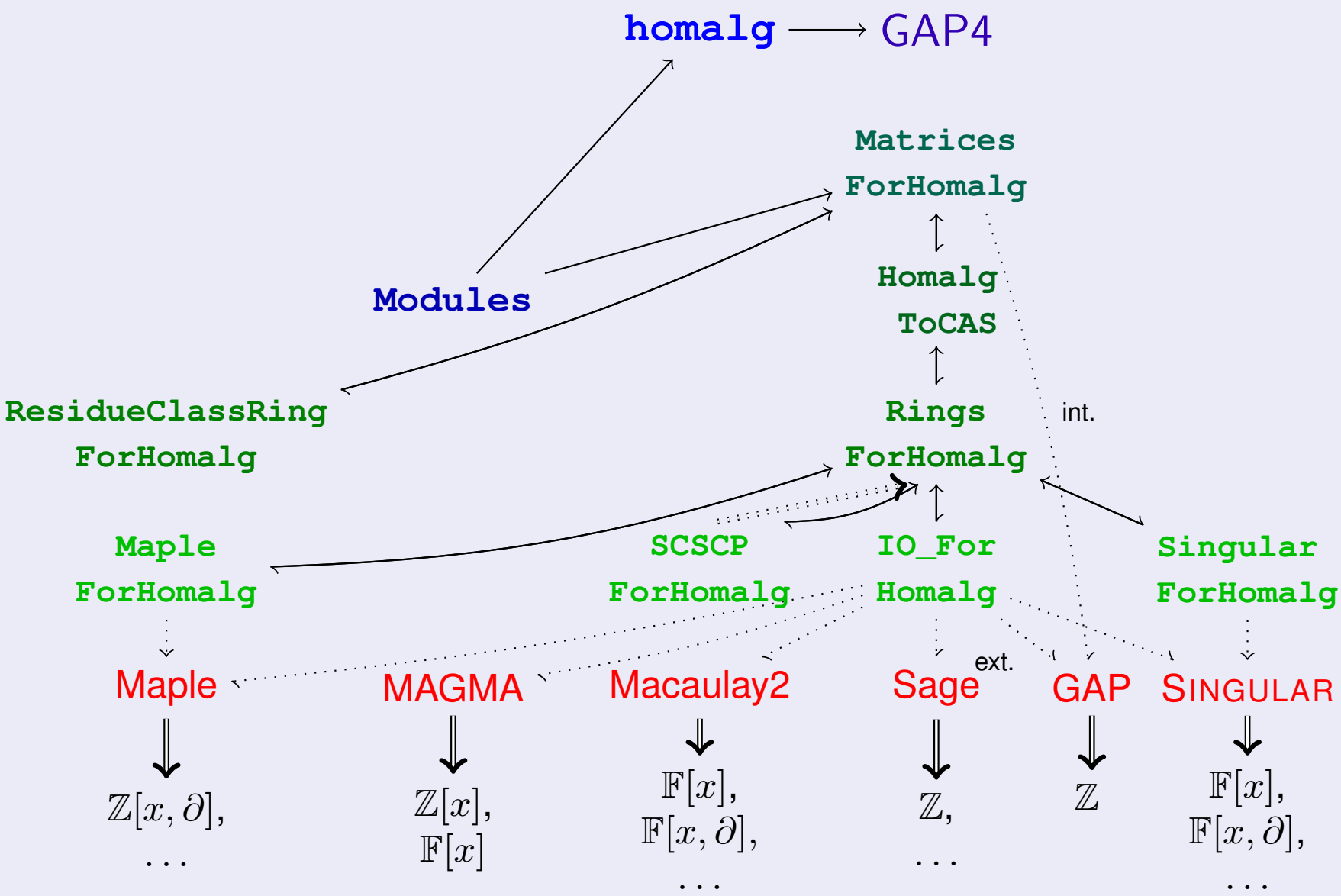
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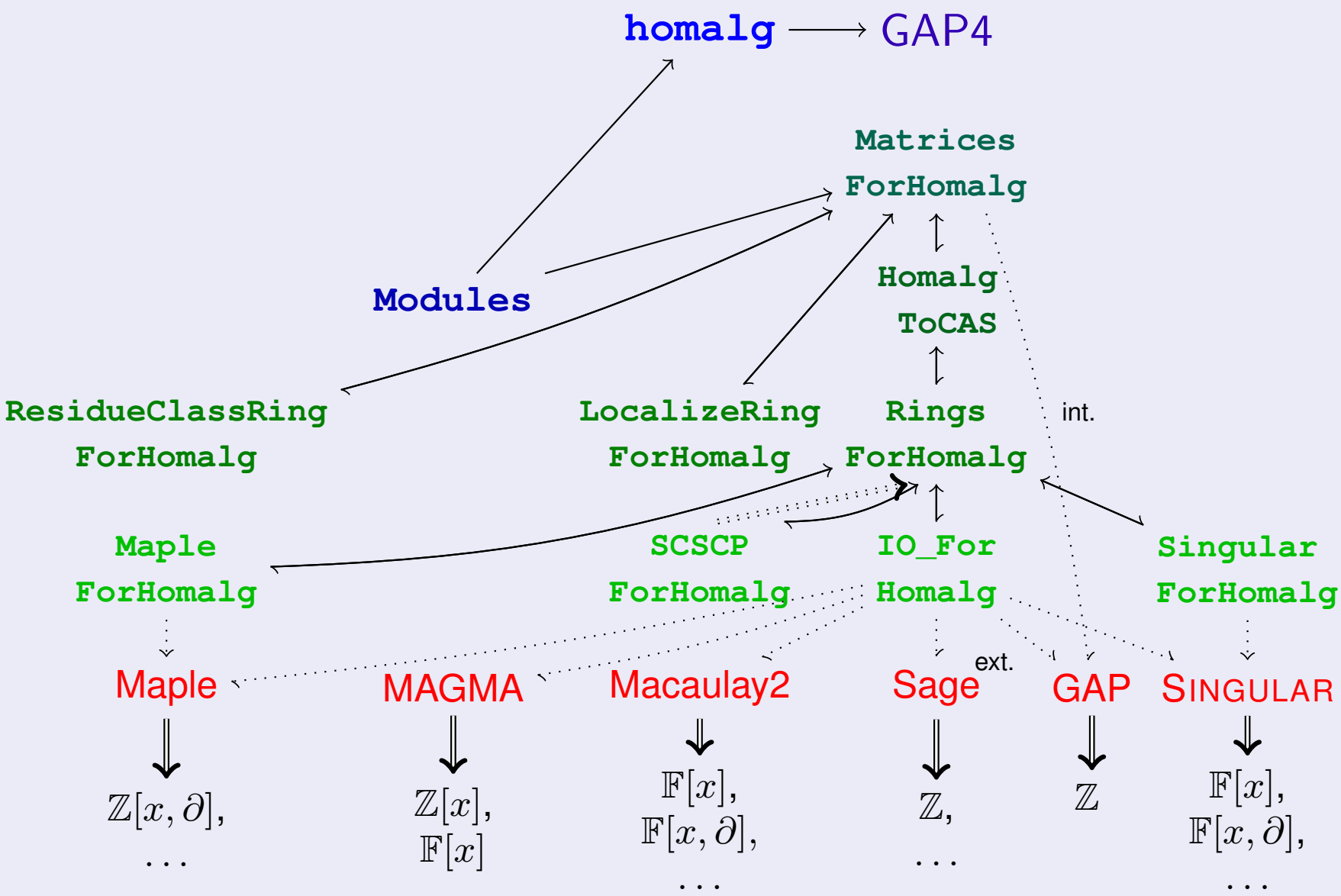
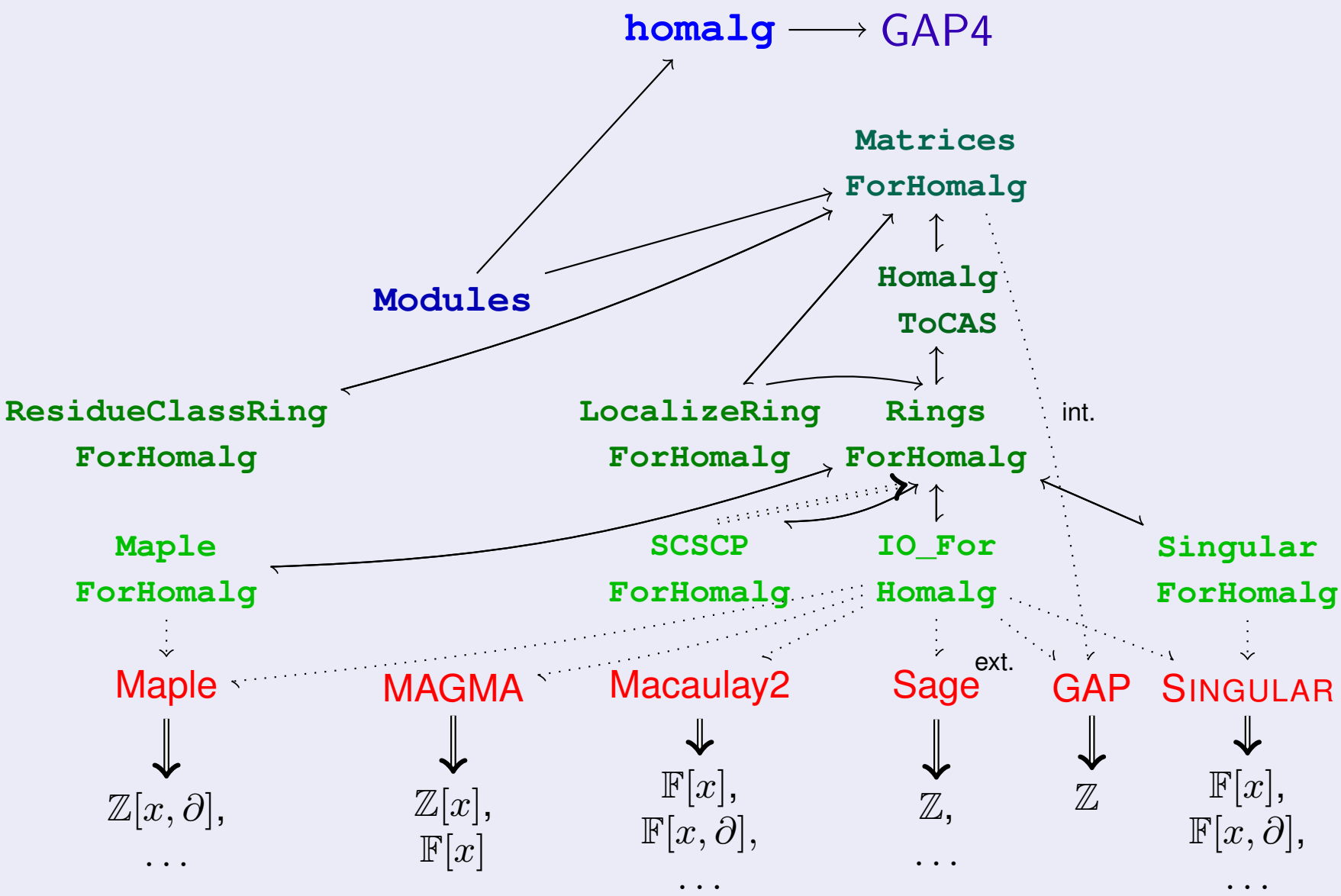
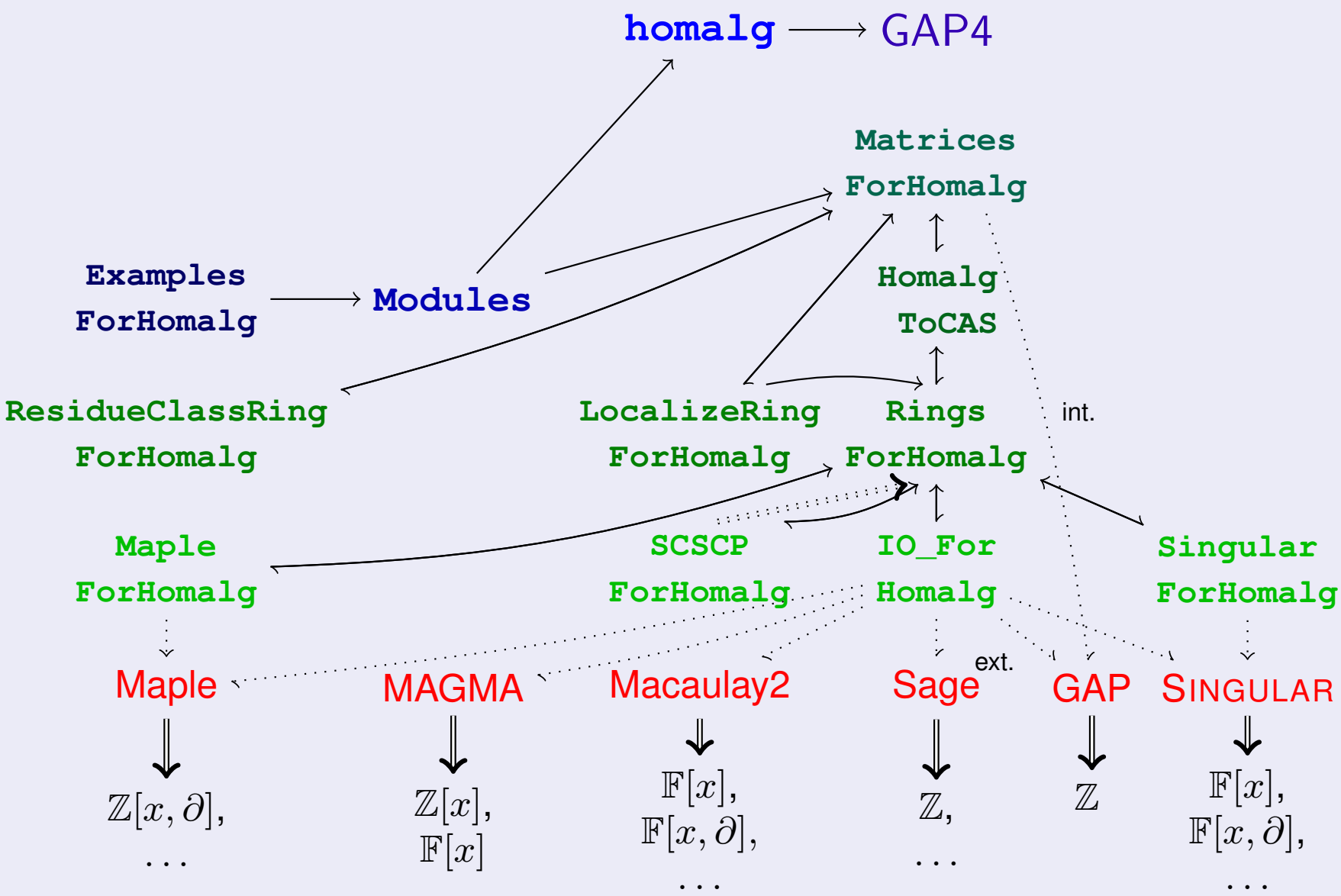
LocalizeRingForHomalg: Localizations of commutative rings in homalg at maximal ideals.



LocalizeRingForHomalg: Use MORA's algorithm in SINGULAR to localize polynomial rings at maximal ideals.

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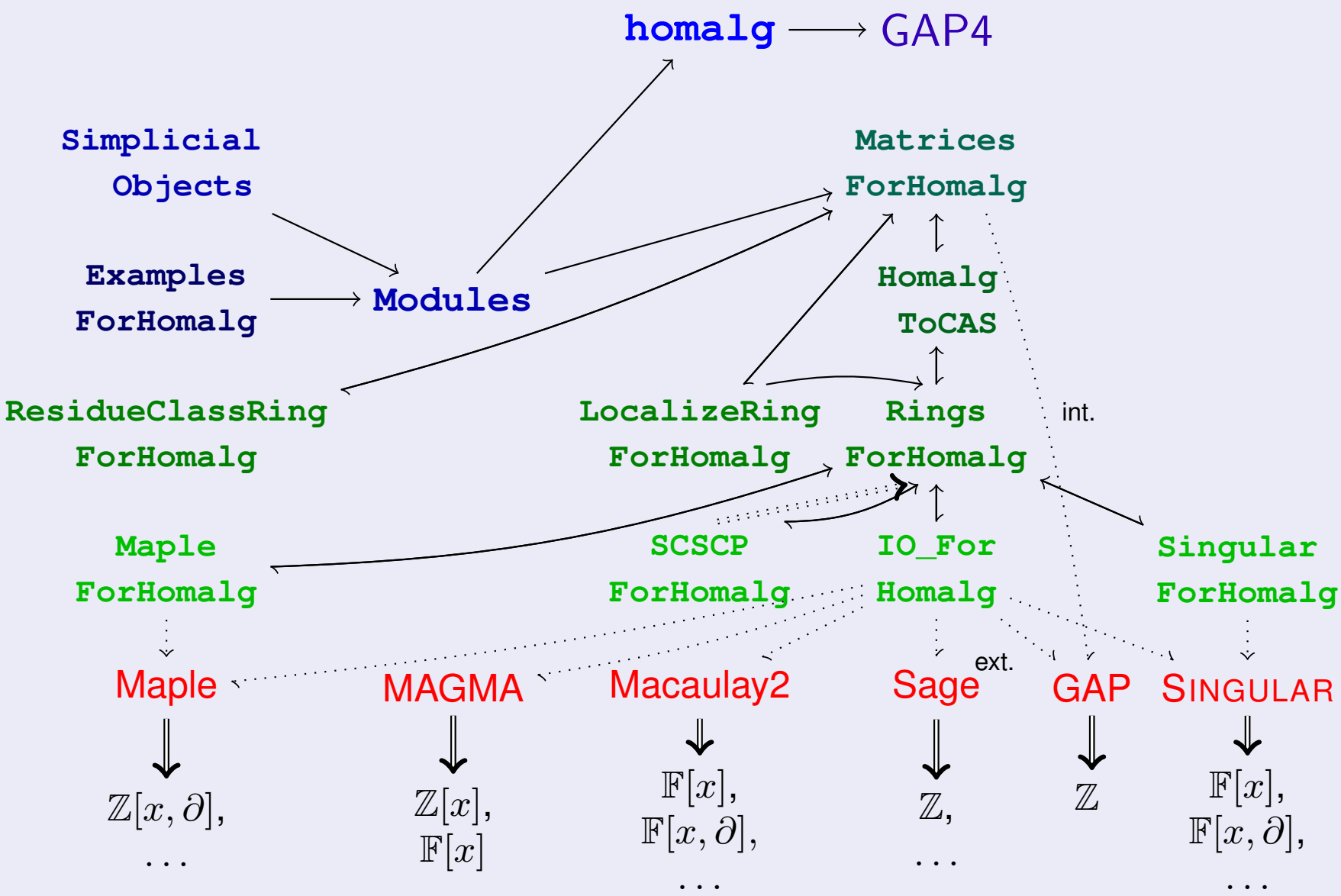
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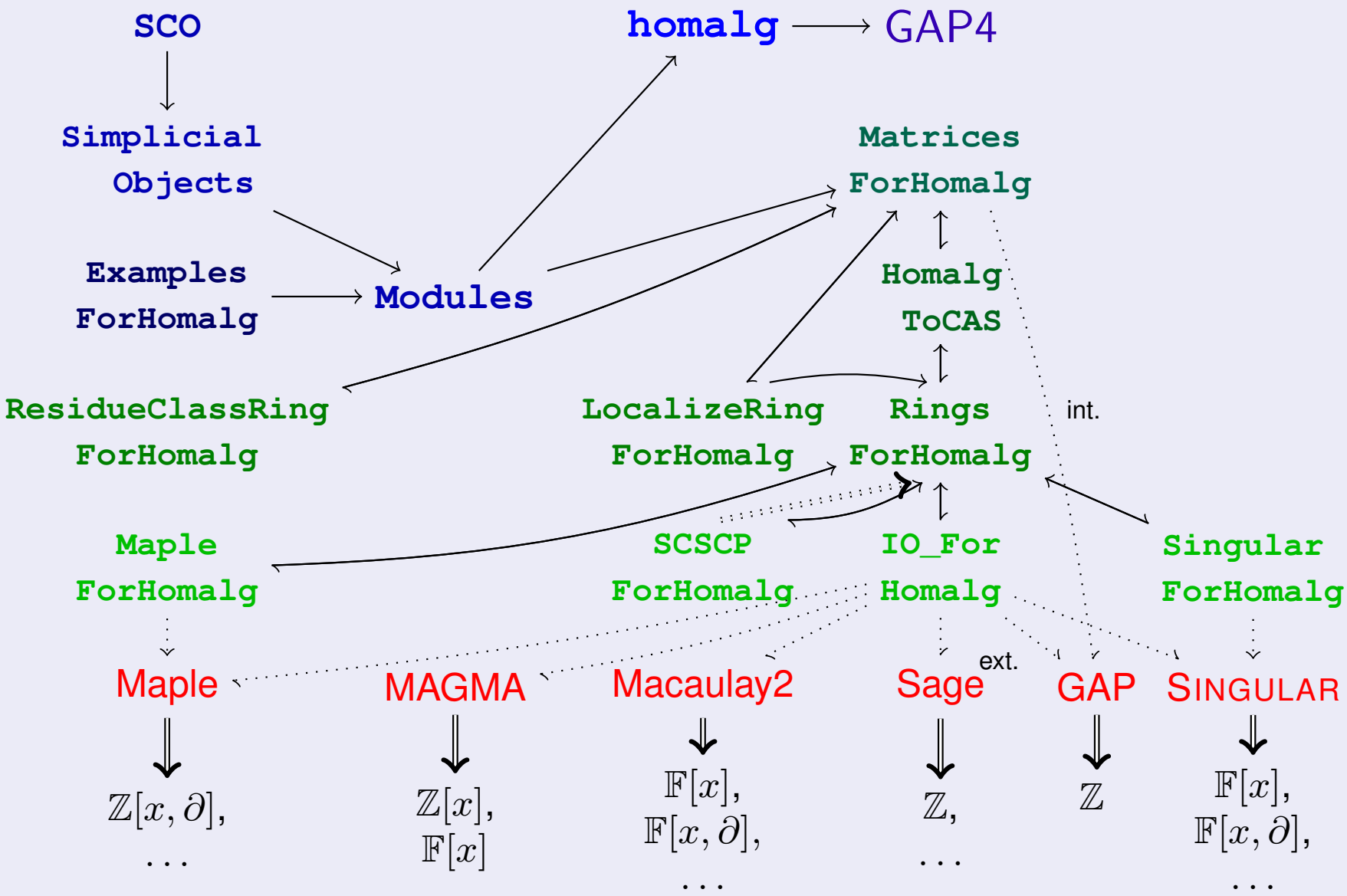
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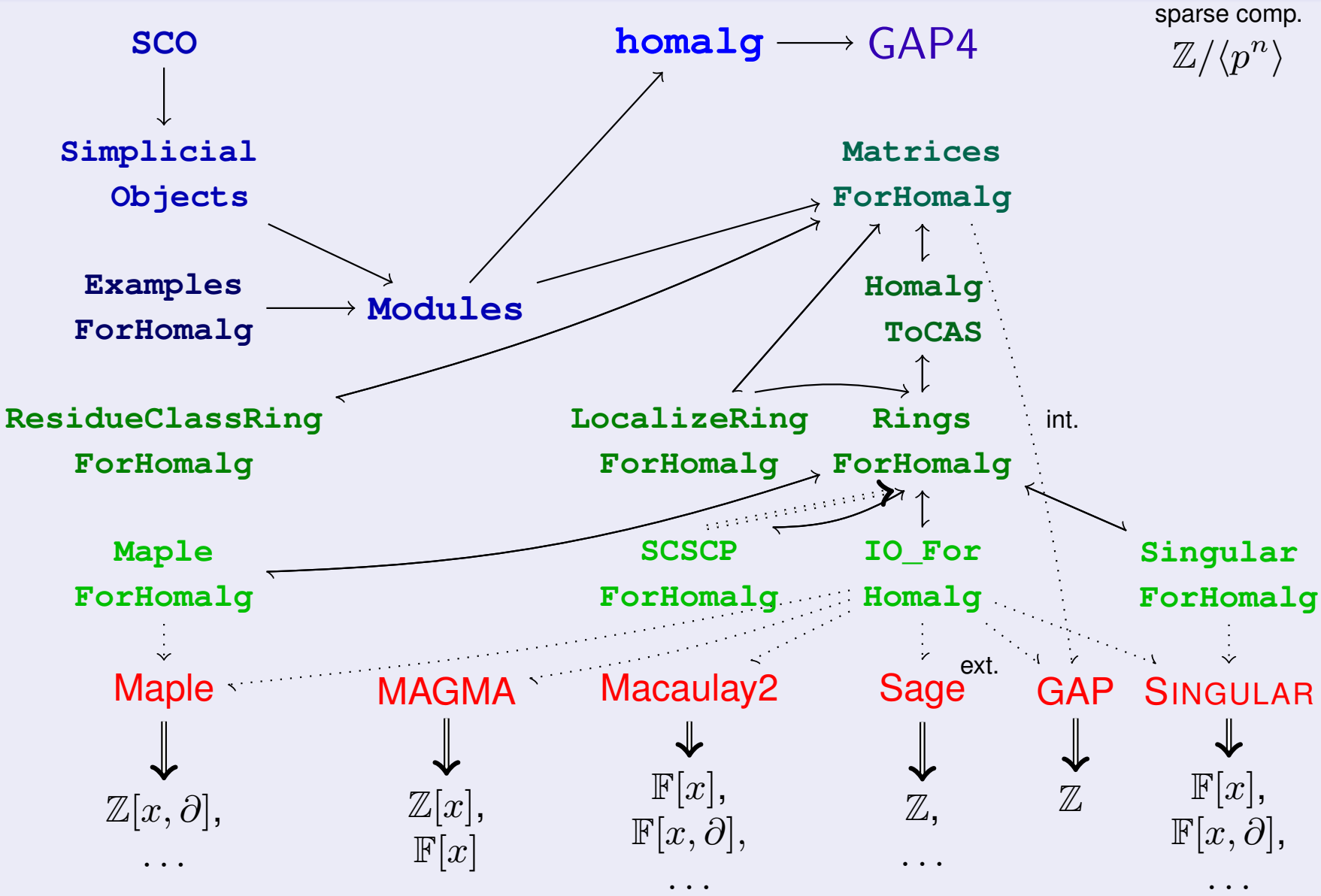
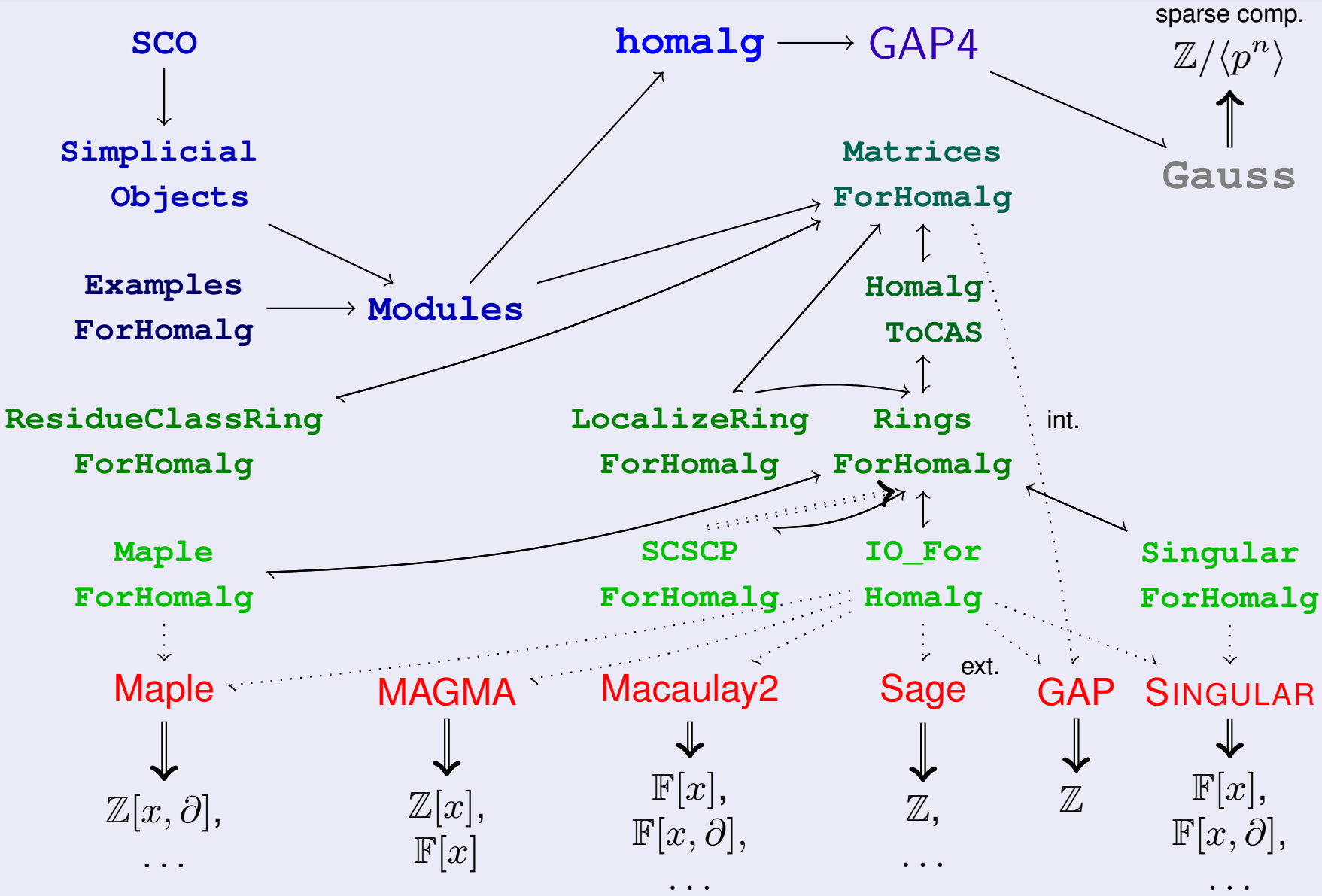
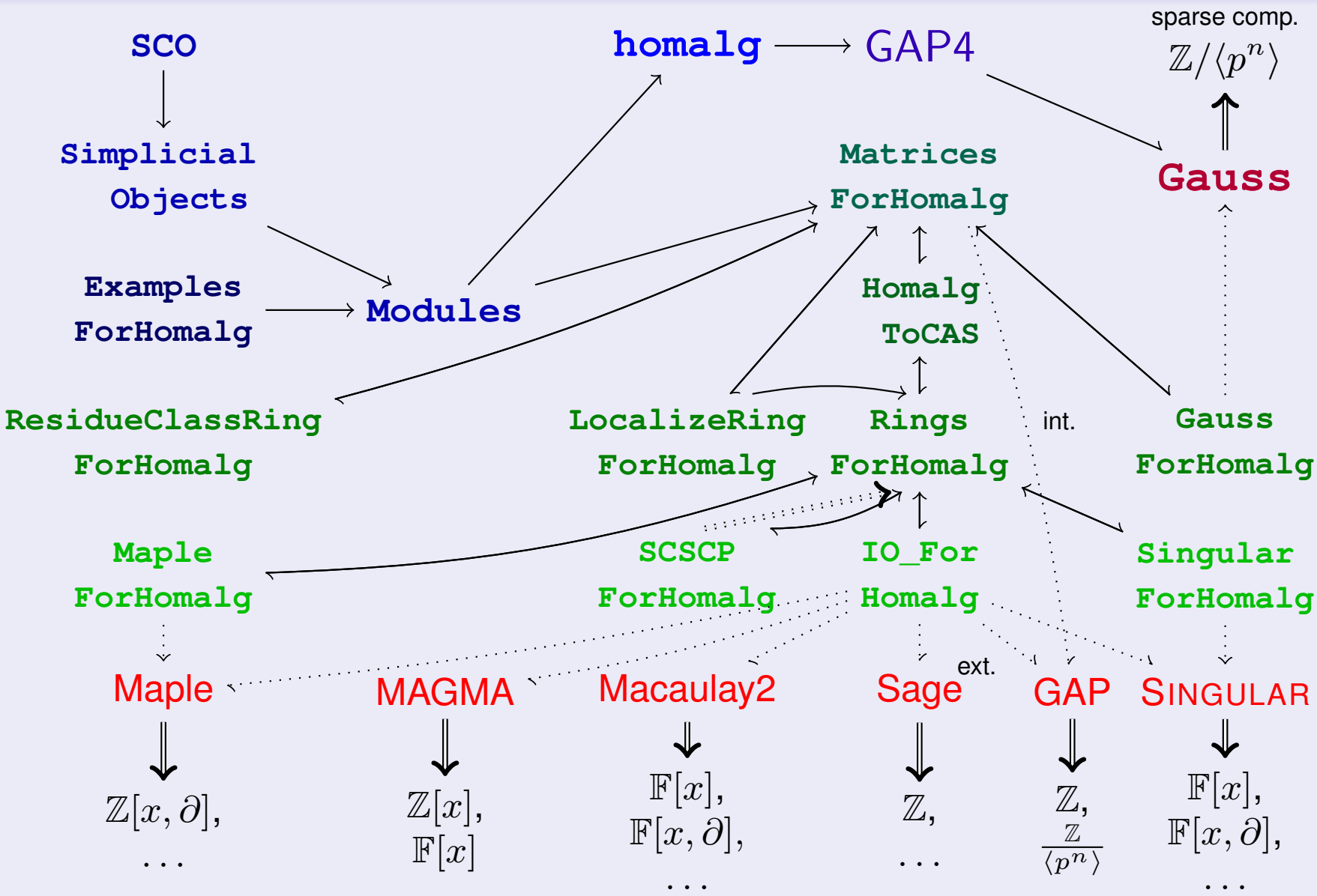
Sparse computations over p-adic numbers (a necessity not only for SCO)



Gauss: Added missing RREF to GAP4 for **sparse** matrices over $\mathbb{Z}/p^n\mathbb{Z}$ and $\mathbb{Q}$

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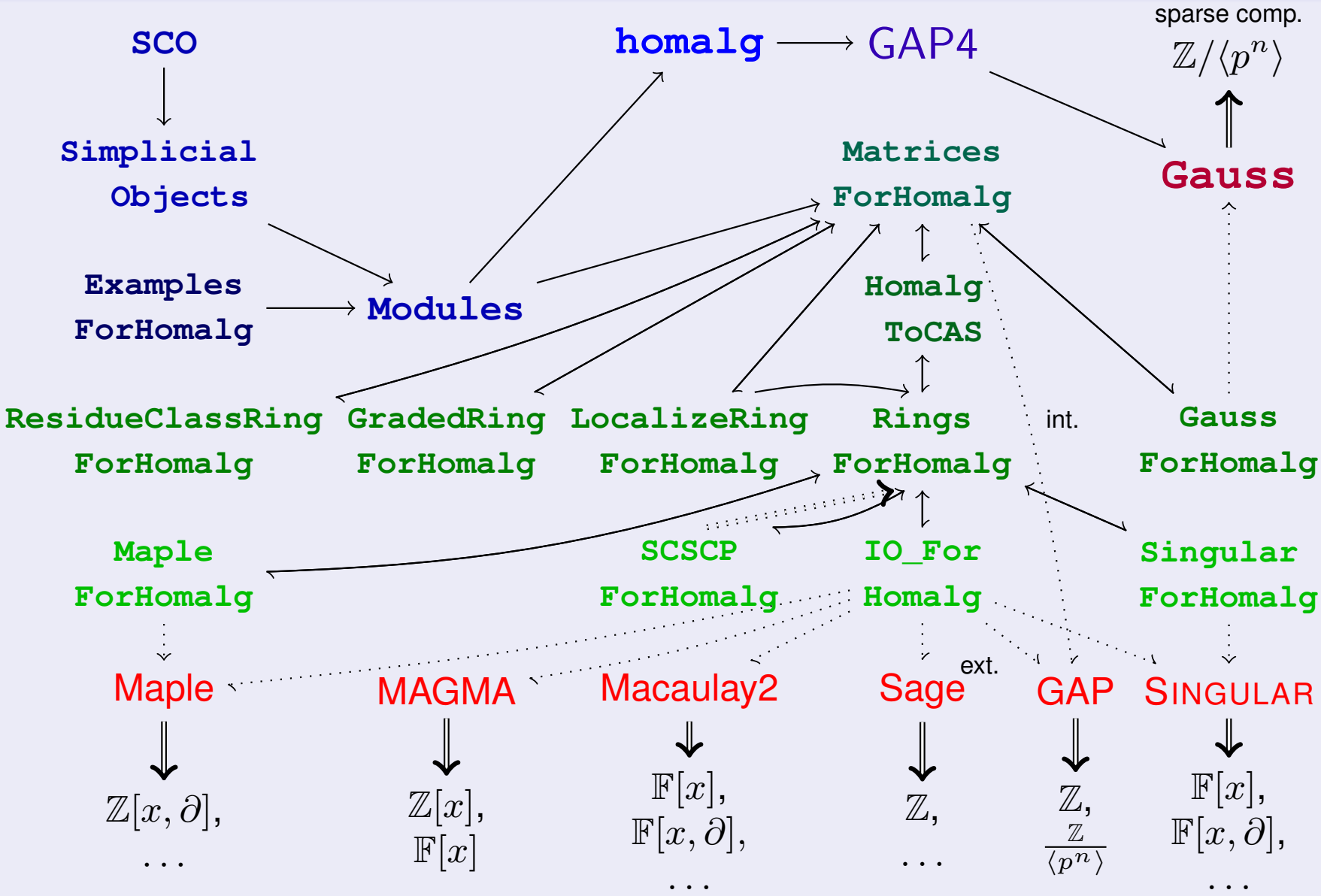
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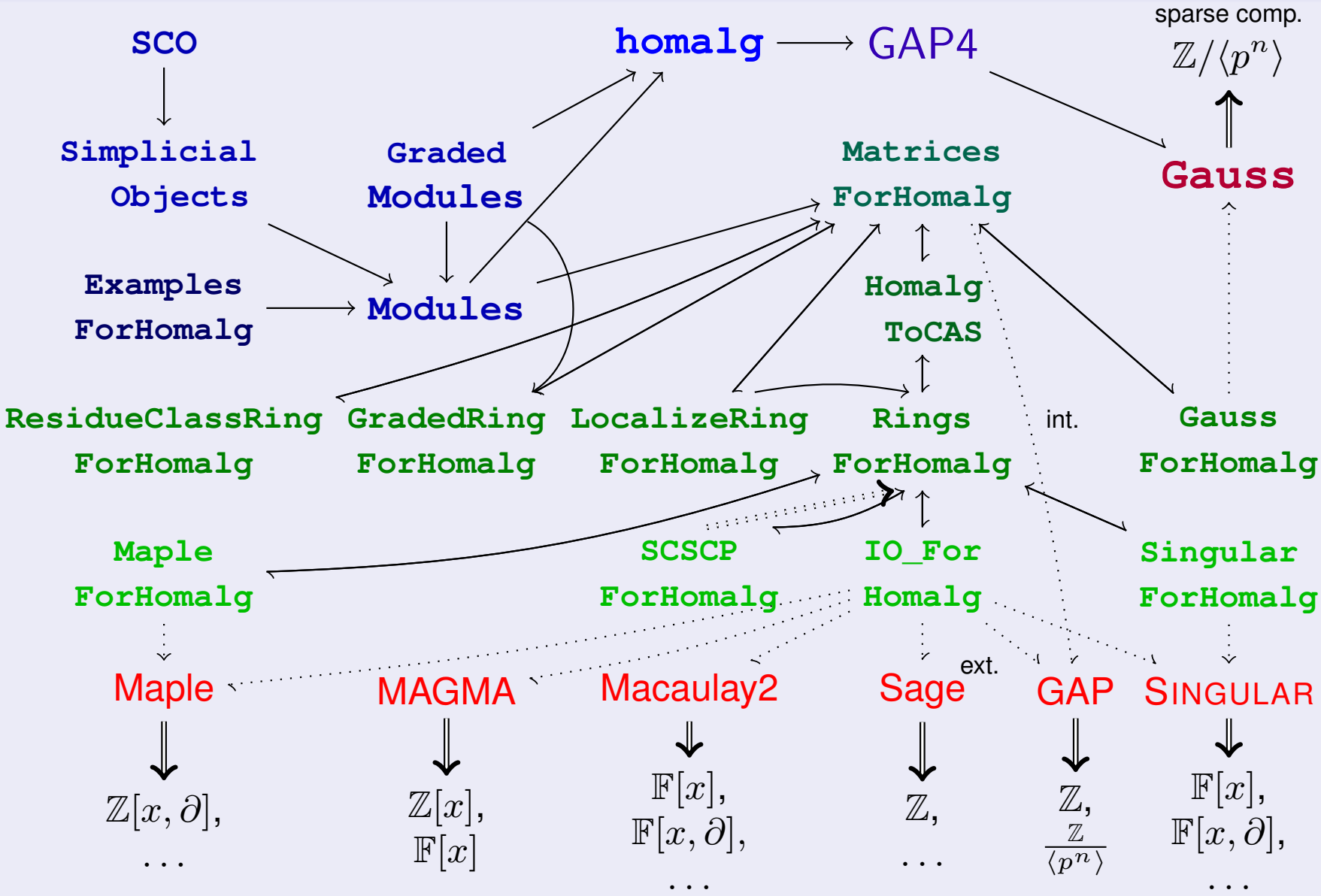
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Sheaves: Coherent sheaves of modules (& future projects: Advanced applications building upon homalg)