CoCoA-5 - Feature #200

add modules and module operations

29 Jun 2012 18:53 - Anna Maria Bigatti

Status:	Closed		**Start date:**	29 Jun 2012
Priority:	Normal		**Due date:**	
Assignee:	Anna Maria Bigatti		**% Done:**	100%
Category:	CoCoA-4 function to be added		**Estimated time:**	27.00 hours
Target version:	CoCoA-5.1.0 Easter14		**Spent time:**	27.05 hours

Description

We have modules in CoCoALib.
Just mimick ideals to add modules..... will it be that easy?

Probably we'll have some surprises with module operations... cross fingers!!

Related issues:

Related to CoCoALib - Design #297: Modules design: brainstorming	**In Progress**	**25 Jan 2013**
Related to CoCoALib - Feature #304: Module ordering and grading (and shifts)	**Closed**	**11 Feb 2013**
Related to CoCoALib - Design #305: FreeModule: unique copy?	**In Progress**	**12 Feb 2013**
Related to CoCoA-5 - Feature #330: Syzygy for modules: homogeneous module	**Closed**	**15 Mar 2013**
Related to CoCoA-5 - Feature #388: port optimized resolutions to CoCoA-5	**New**	**23 Jul 2013**
Related to CoCoALib - Feature #387: implement algorithm(s) for resolutions	**New**	**23 Jul 2013**
Related to CoCoA-5 - Support #341: Remove/replace the word "vector" in the ma...	**Closed**	**17 Apr 2013**
Related to CoCoA-5 - Bug #509: SyzOfGens (CoCoA-5) does not have correct shifts	**Closed**	**03 Apr 2014**
Related to CoCoA-5 - Feature #702: Add more operations for modules	**New**	**15 May 2015**
Related to CoCoALib - Design #703: Add more operations between modules (CoCoA...	**New**	**15 May 2015**

History

#1 - 22 Jan 2013 17:17 - Anna Maria Bigatti

- Status changed from New to In Progress

- % Done changed from 0 to 10

added types MODULE and MODULEELEM.
added functions: NewFreeModule, arithmetics for type MODULEELEM.

#2 - 22 Jan 2013 18:17 - Anna Maria Bigatti

- Category set to CoCoA-4 function to be added

- Assignee set to Anna Maria Bigatti

- Target version set to CoCoA-5.0.3

added zero(module), BaseRing(module), RingOf(module), RingOf(ModuleElem)
added stub documentation

#3 - 23 Jan 2013 15:52 - Anna Maria Bigatti

- % Done changed from 10 to 20

#4 - 12 Feb 2013 11:03 - Anna Maria Bigatti

added **LPP**, **LPosn**, **LT**, **wdeg**

#5 - 13 Feb 2013 10:13 - Anna Maria Bigatti

added **FirstNonZeroPosn**, **homog(ModuleElem)** (for GradingDim=1)

#6 - 20 Feb 2013 18:04 - Anna Maria Bigatti

Added **SyzOfGens** for an **ideal** both in cocoalib and cocoa-5
(and manual in cocoa-5).
This is still quite rough as there is no control on the module in which the output resides (this is automatically created in the raw C++ code).
There should be at least the possibility of passing the free module so that two successful computation reside in the same module.

```
/**/  I := Ideal(x, x, y);
/**/  SyzOfGens(I);
submodule(FreeModule(...), [[1, -1, 0], [0, y, -x]])
```

#7 - 21 Feb 2013 17:20 - Anna Maria Bigatti

added **GensAsRows**, **GensAsCols** (and manual)
added **NewFreeModuleForSyz** + consequences

#8 - 21 Feb 2013 18:13 - Anna Maria Bigatti

- Estimated time changed from 10.00 h to 20.00 h

#9 - 22 Feb 2013 13:42 - Anna Maria Bigatti

added **GenRepr** in packages/hilop

#10 - 08 Apr 2013 15:52 - John Abbott

New module fns to add:

- rank
- IsIn
- equality test

#11 - 31 May 2013 18:04 - Anna Maria Bigatti

- % Done changed from 20 to 30

#12 - 04 Jun 2013 07:24 - Anna Maria Bigatti

John Abbott wrote:

- IsIn
- equality test

added **IsElem**, **IsContained** for (sub)modules, and then **IsIn** and **equality test**

#13 - 31 Jul 2013 15:53 - Anna Maria Bigatti

- Target version changed from CoCoA-5.0.3 to CoCoA-5.0.9

- % Done changed from 30 to 50

added **v[i]** where v is a ModuleElem (real miracle in Interpreter.[HC], **indexedByBigInt**),
added **IsHomog(M)**, **IsZero(M)**, **LT** for M (sub)module.
currently working on HilbertSeries.

#14 - 31 Jul 2013 16:39 - Anna Maria Bigatti

added **NumCompts** for MODULE annd MODULEELEM

#15 - 01 Aug 2013 15:49 - Anna Maria Bigatti

added **LC** and **DivAlg**, fixed manual entries.
renamed LPos into **LPosn**.

#16 - 25 Mar 2014 17:37 - John Abbott

- Target version changed from CoCoA-5.0.9 to CoCoA-5.1.0 Easter14

#17 - 28 Mar 2014 09:08 - Anna Maria Bigatti

Added **MinGens**

#18 - 08 Apr 2014 17:54 - Anna Maria Bigatti

- % Done changed from 50 to 60

added **submodule(gens)**
where gens is a non-empty vector of ModuleElem in the same Module.

#19 - 08 Apr 2014 20:14 - Anna Maria Bigatti

added **shifts(FreeModule)**

#20 - 11 Apr 2014 15:03 - Anna Maria Bigatti

- Status changed from In Progress to Closed

- % Done changed from 60 to 100

Most operations have been implemented by now.
Remaining functions will be under their own "issue".

#21 - 15 May 2015 09:02 - Anna Maria Bigatti

- Estimated time changed from 20.00 h to 27.00 h