CoCoALib - Slug #1337

PrimaryDecomposition: a interesting/pathological example

15 Oct 2019 11:41 - Anna Maria Bigatti

Status:	In Progress	**Start date:**	15 Oct 2019
Priority:	Normal	**Due date:**	
Assignee:	Anna Maria Bigatti	**% Done:**	10%
Category:	Improving	**Estimated time:**	0.00 hour
Target version:	CoCoALib-0.99880	**Spent time:**	0.50 hour

Description

This example is very very slow because a factor of MinPolyQuot(t,I,t) produces an ideal with a very slow GBasis.

```
K ::= ZZ/(101);
use P ::= K[x,y,z,t];

F1 := x*y*z*t +83*y^3 +73*x^2 -85*z^2 -437*t;
F2 := y^3*z*t +z -t;
F3 := t^4 +z*t^2 -324*z^3 +94*x^2 +76*y;
F4 := x^11*z +26*t^3 +625*y;

I := ideal(F1, F2, F3, F4);

R:=CpuTime(); RGB := ReducedGBasis(I);  TimeFrom(R);
R:=CpuTime(); PD := PrimaryDecomposition(I);  TimeFrom(R);
```

The primary decomposition in ZZ/(101)[t,z,y,x] takes less than 4s on my (slow) computer.

This is just unlucky!
Can we do something clever about this?

Related issues:

Related to CoCoALib - Slug #1105: Primary Decompositon (zero-dim) slow cases	**Closed**	**02 Oct 2017**

History

#1 - 15 Oct 2019 11:41 - Anna Maria Bigatti

- Description updated

#2 - 15 Oct 2019 11:41 - Anna Maria Bigatti

- Related to Slug #1105: Primary Decompositon (zero-dim) slow cases added

#3 - 16 Feb 2021 18:13 - John Abbott

STATUS 2021-02-16: I confirm that the RGB took about 0.35s on my computer, while PD took 473s.

OBSERVATION: it seems that much of the time is right after the 49th elem has been added to the GB. One or more very costly reductions to zero? Number of pairs dropped from 111 to 4.

#4 - 12 Mar 2021 09:48 - John Abbott

- Description updated

Since we now have GBasis with timeout, perhaps that could be used to implement a sort of "parallel" approach where the first successful branch is followed?

It would be even better if CoCoA had proper parallel primitives (but that is likely far away).

The "faster" indet ordering took about 2.2s on my GNU/Linux computer.

#5 - 28 Jan 2022 13:04 - John Abbott

- Target version changed from CoCoALib-0.99800 to CoCoALib-0.99850

#6 - 08 Mar 2023 21:13 - John Abbott

- Status changed from New to In Progress

- Target version changed from CoCoALib-0.99850 to CoCoALib-0.99880

- % Done changed from 0 to 10

2023-03-08 I have just run the example (on my current GNU/Linux box).
The times are: 0.33s and 499s (ouch! slower!)

Postponing to 0.99880: it works, just a bit slow (sometimes).