GRASS GIS in the Cloud

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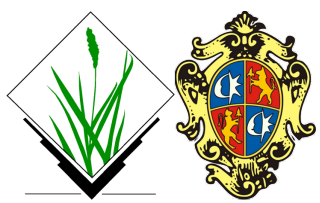
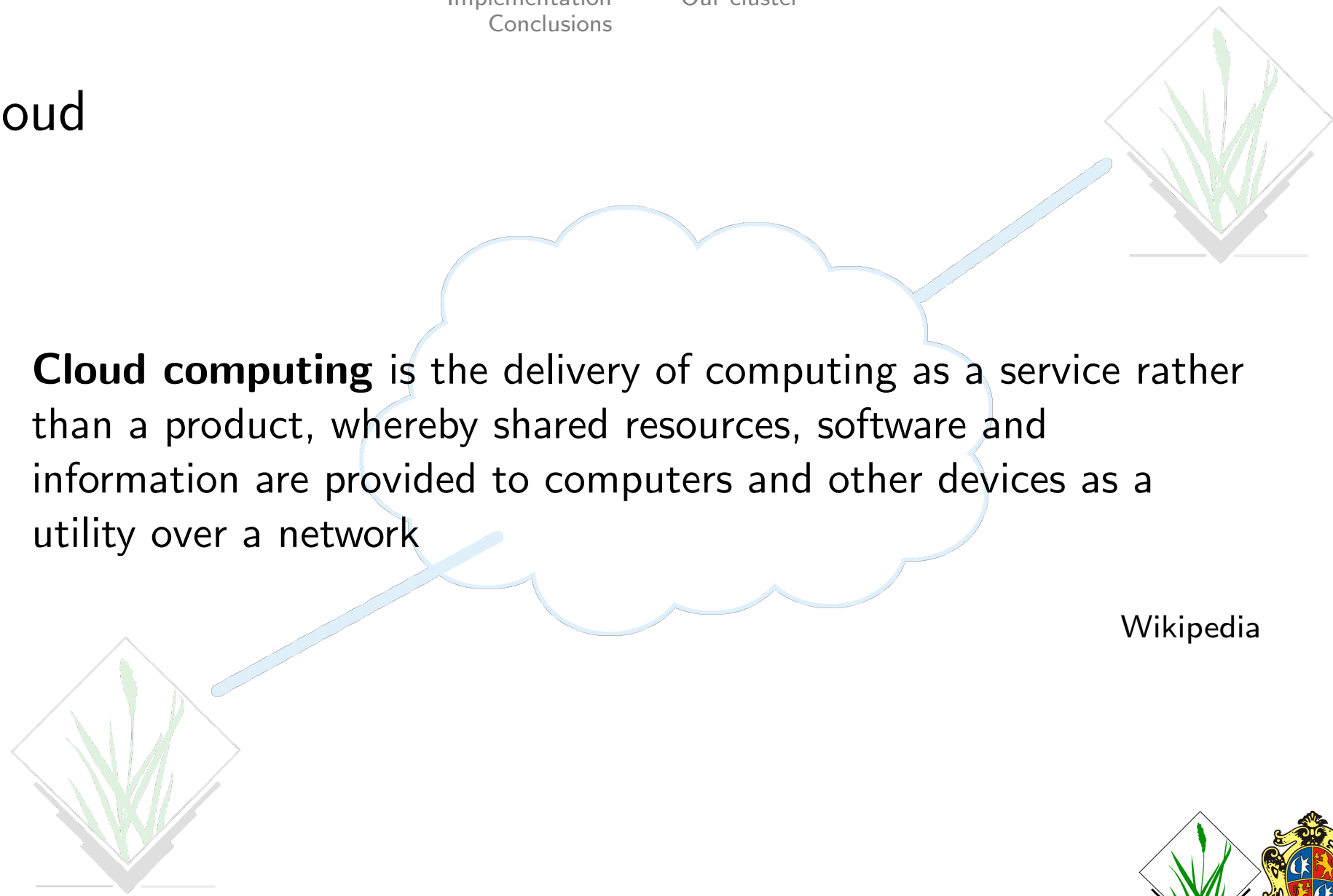
http://gis.cri.fmach.it

XIII Meeting GRASS e GFOSS

17th February 2012, Trieste (Italy)



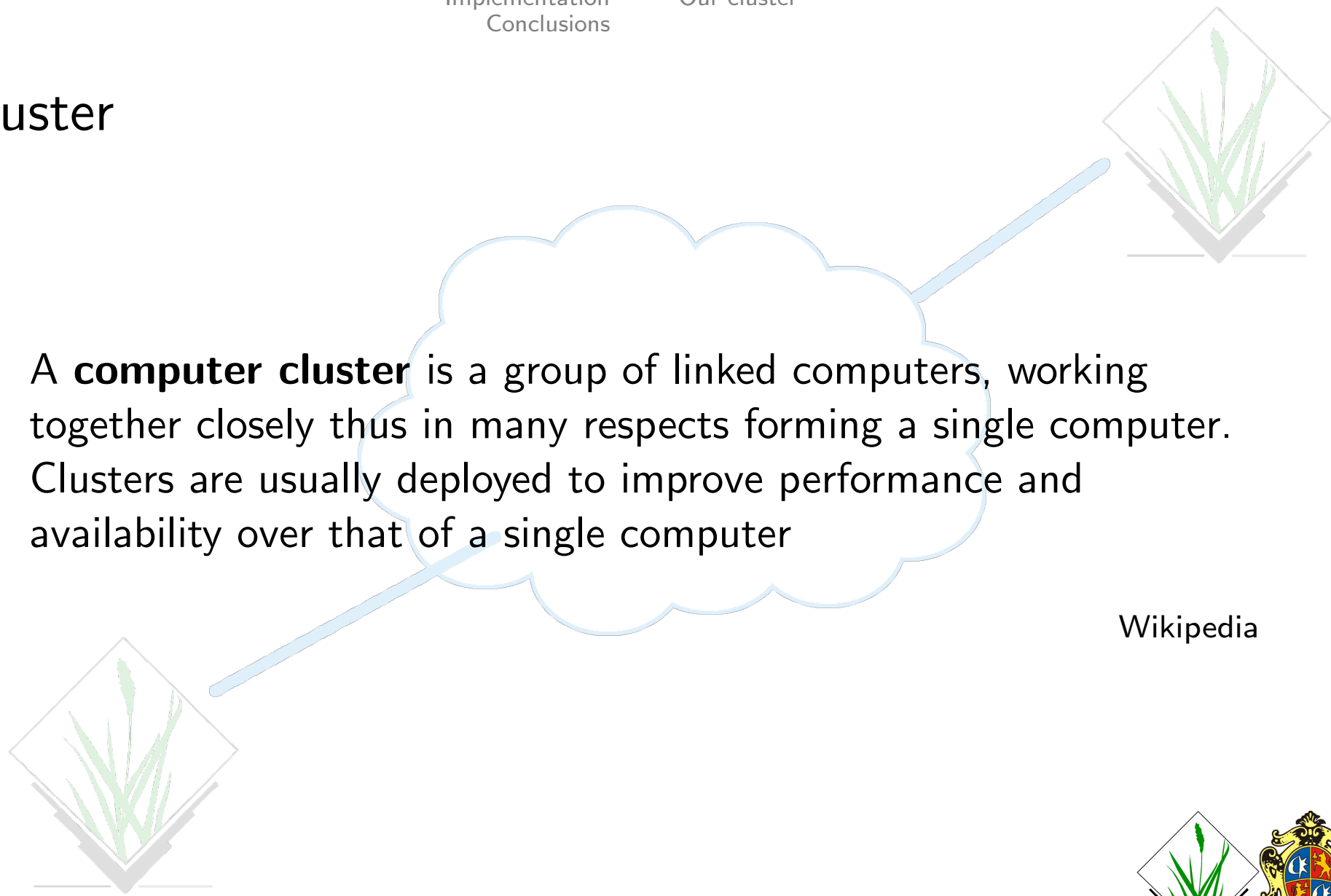
Cloud



Cloud computing is the delivery of computing as a service rather than a product, whereby shared resources, software and information are provided to computers and other devices as a utility over a network

Wikipedia

Cluster



A **computer cluster** is a group of linked computers, working together closely thus in many respects forming a single computer. Clusters are usually deployed to improve performance and availability over that of a single computer

Wikipedia

Our cluster: infrastructure

FEM GIS cluster consists of

- 300 nodes
- 610 GB RAM
- 34 TB disk storage + 15 TB tape backup
- 10 Gb/s internal bus
- Scientific Linux 6.2
- **Grid Engine**

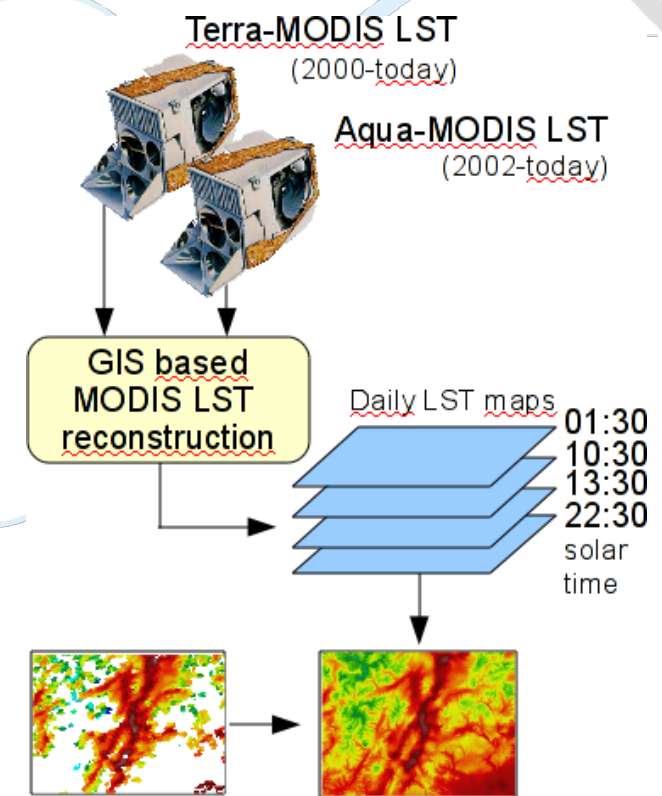
Our cluster: massive spatial data analysis

MODIS Land Surface Temperature (LST) map gap-filling (13,000 maps)

MODIS data analysis (LST, NDVI, Snow products)

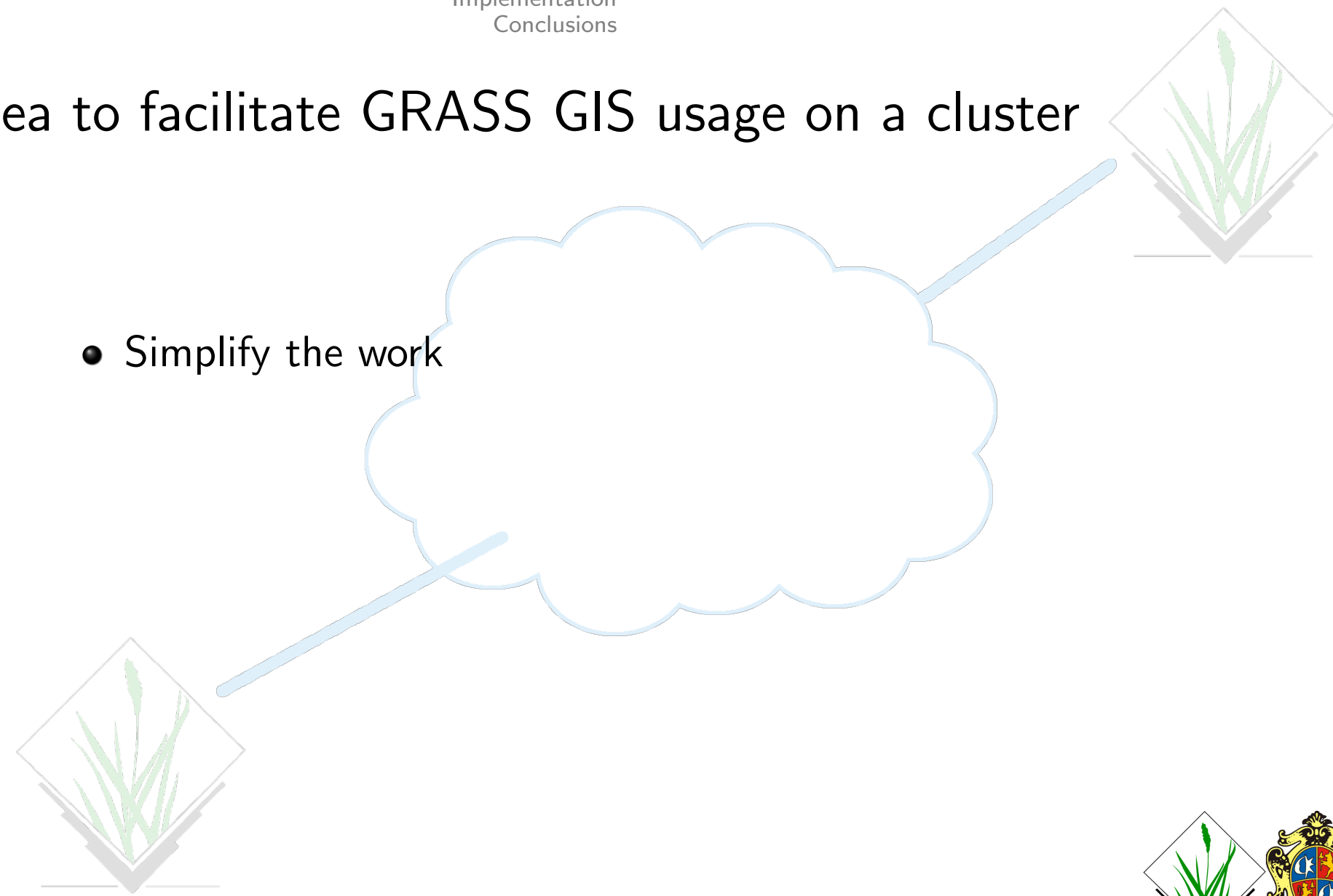
LiDAR data analysis

Solar energy calculations



Neteler et al., 2011: Tiger mosquito, IJHG, doi:10.1186/1476-072X-10-49

Idea to facilitate GRASS GIS usage on a cluster



- Simplify the work

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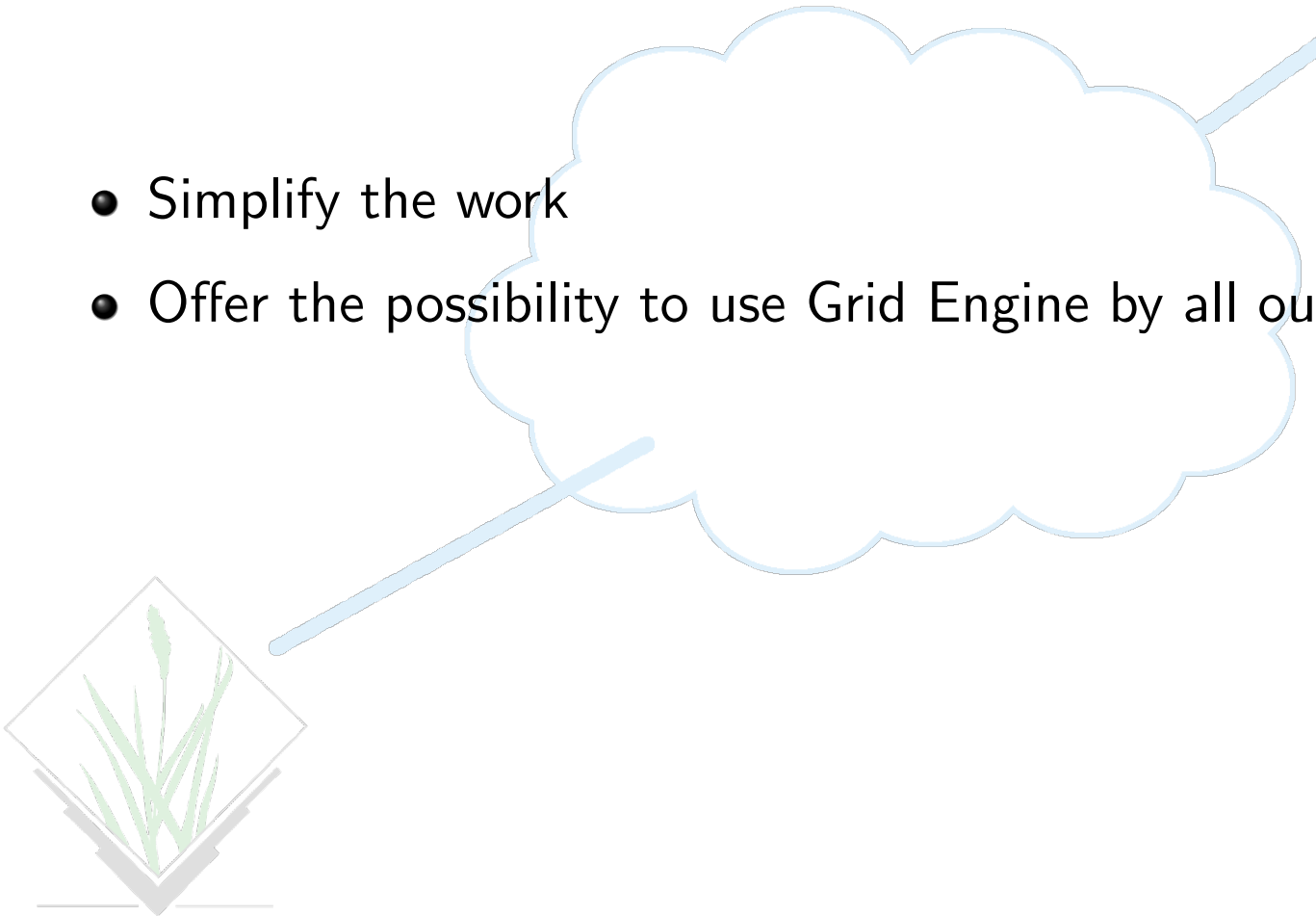

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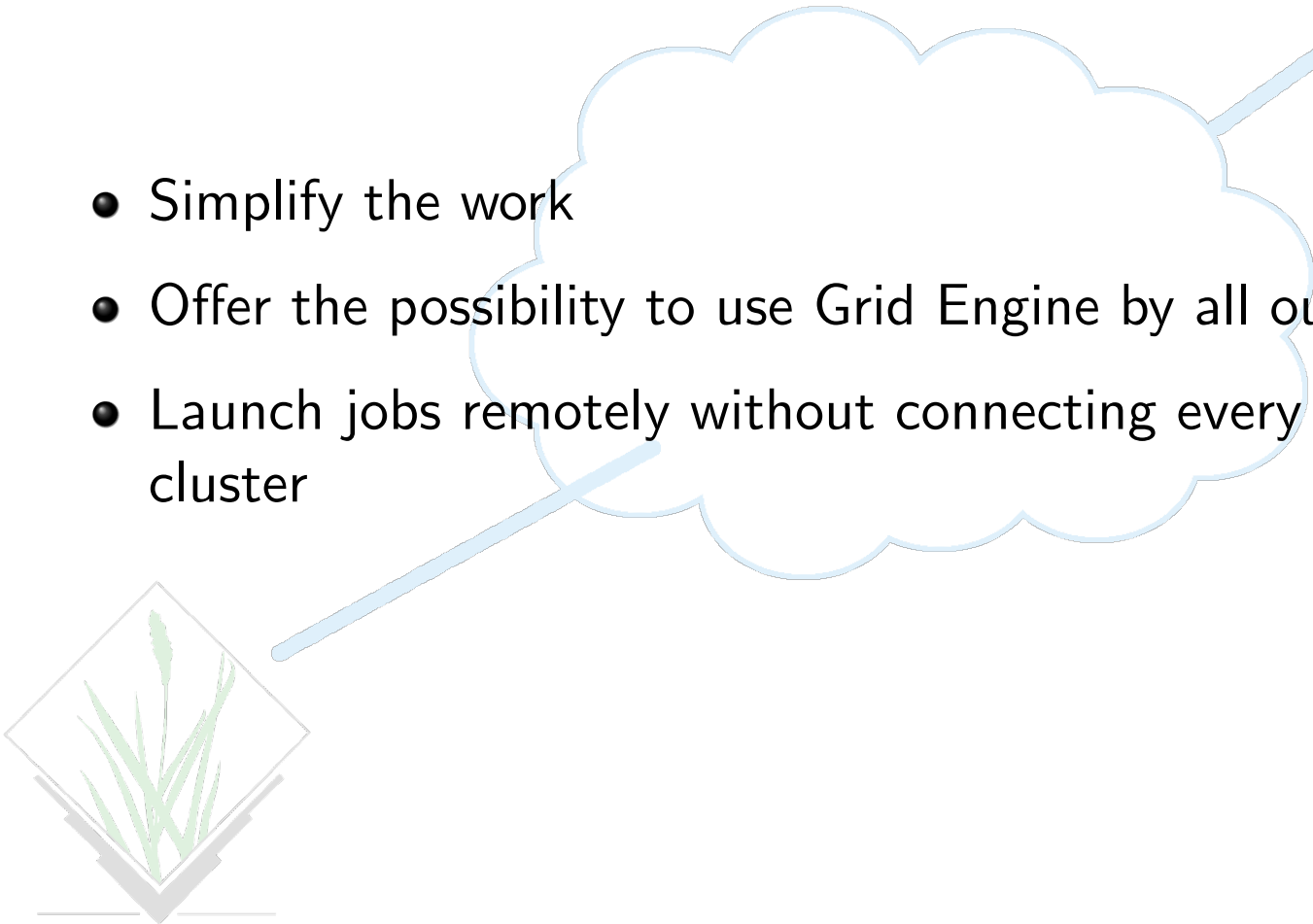

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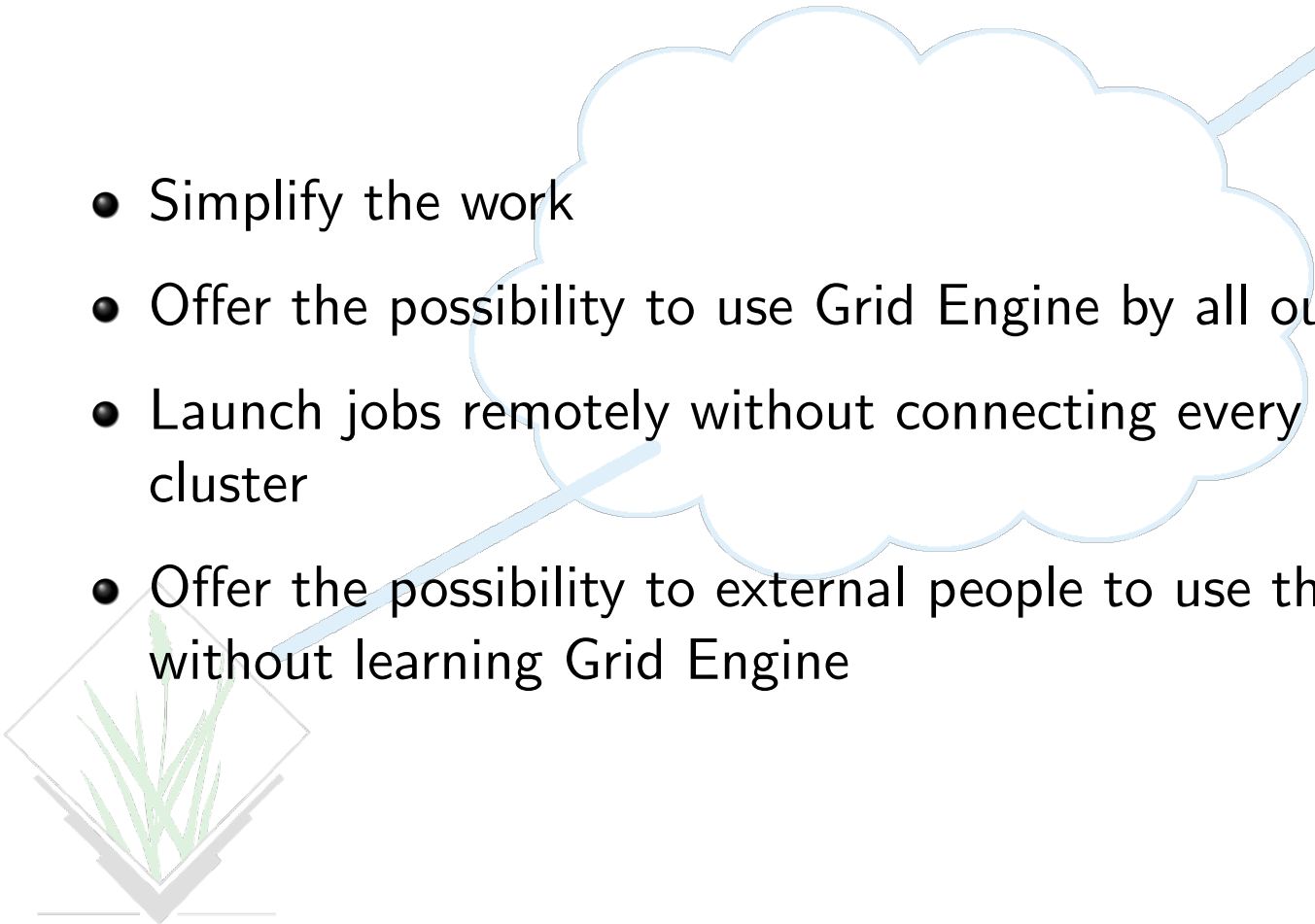
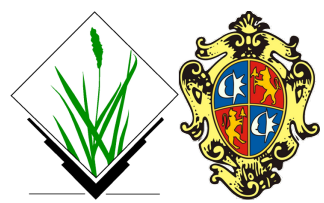
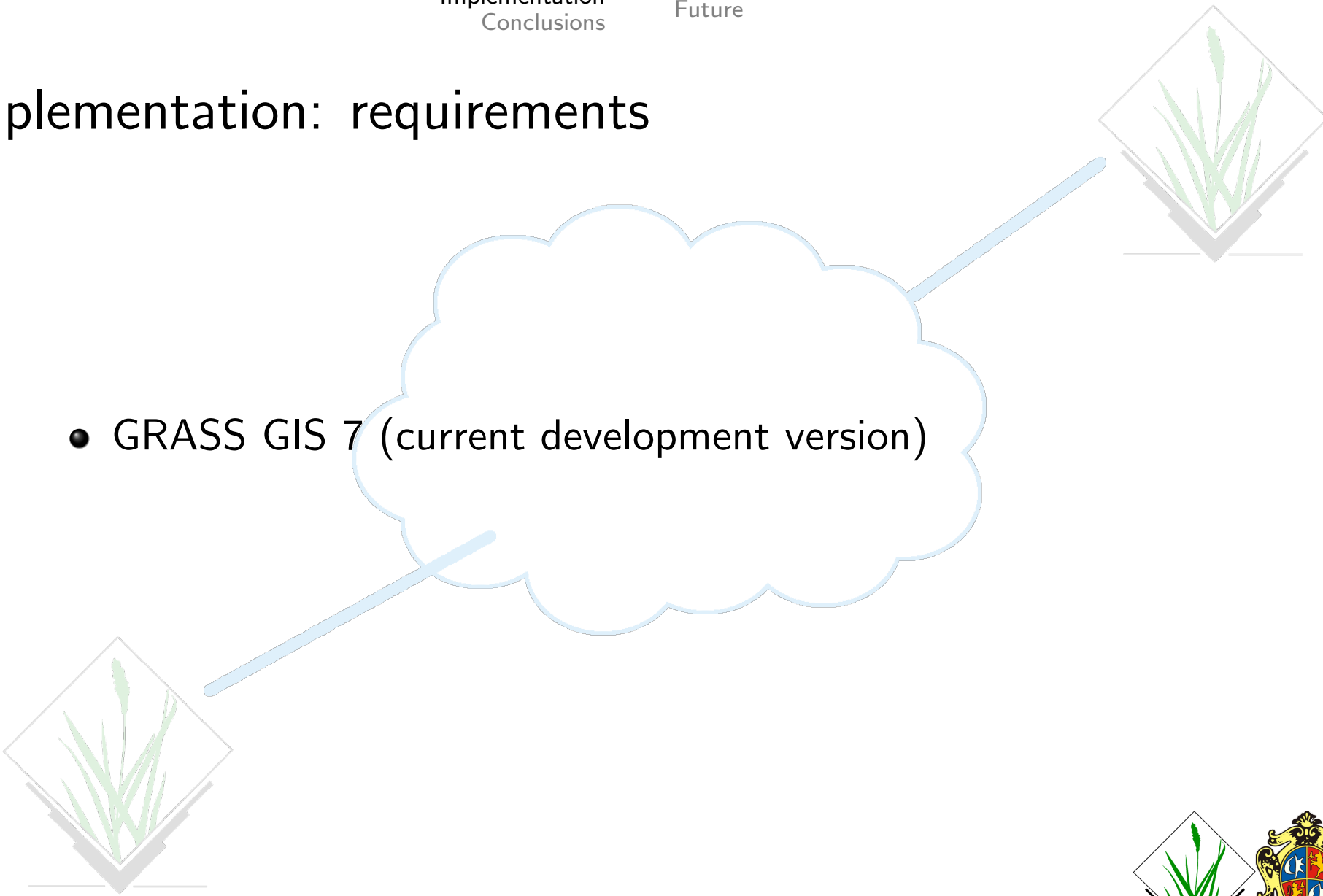


- Simplify the work
- Offer the possibility to use Grid Engine by all our colleagues
- Launch jobs remotely without connecting every time to the cluster
- Offer the possibility to external people to use the cluster without learning Grid Engine

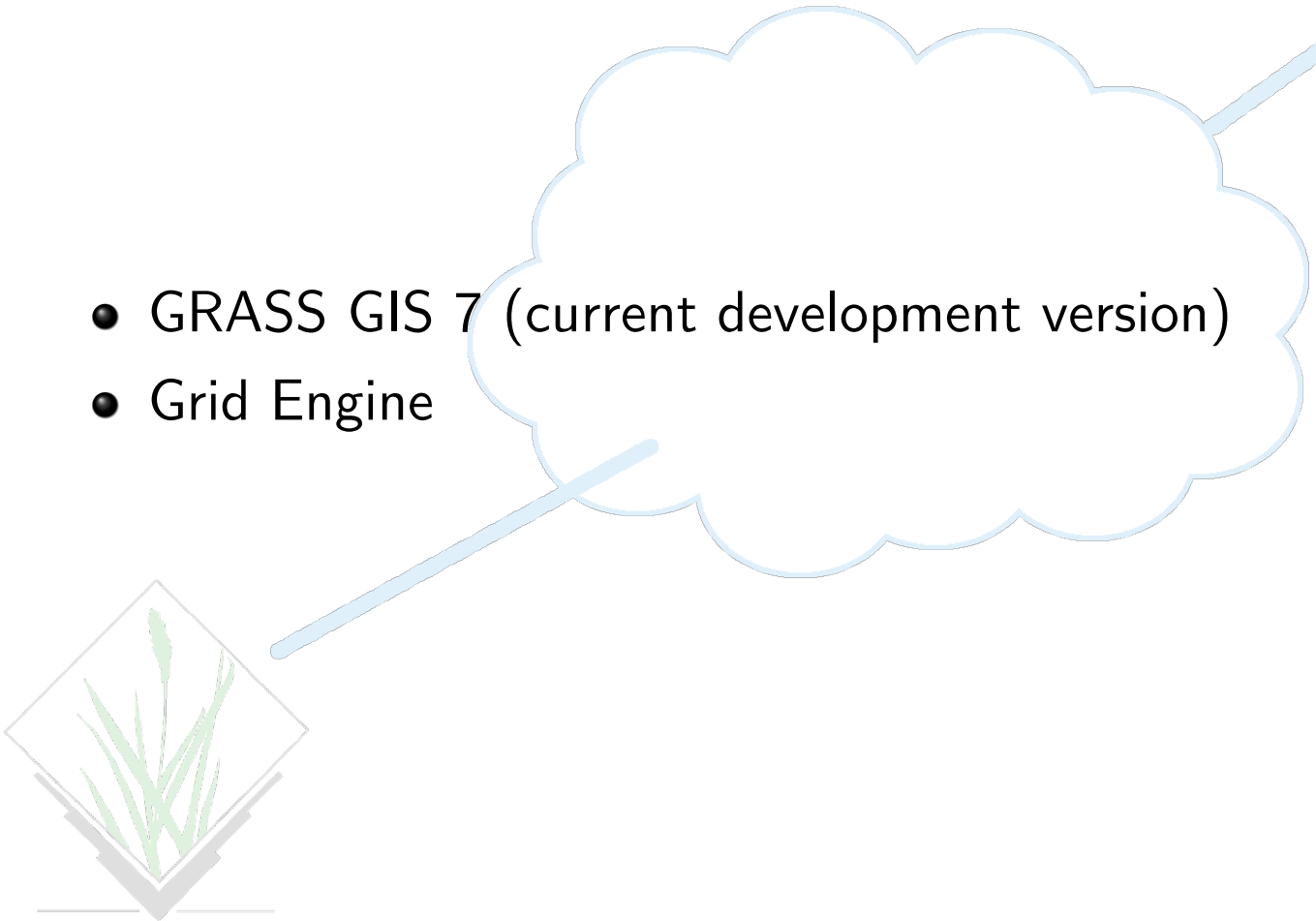


Implementation: requirements



- GRASS GIS 7 (current development version)

Implementation: requirements



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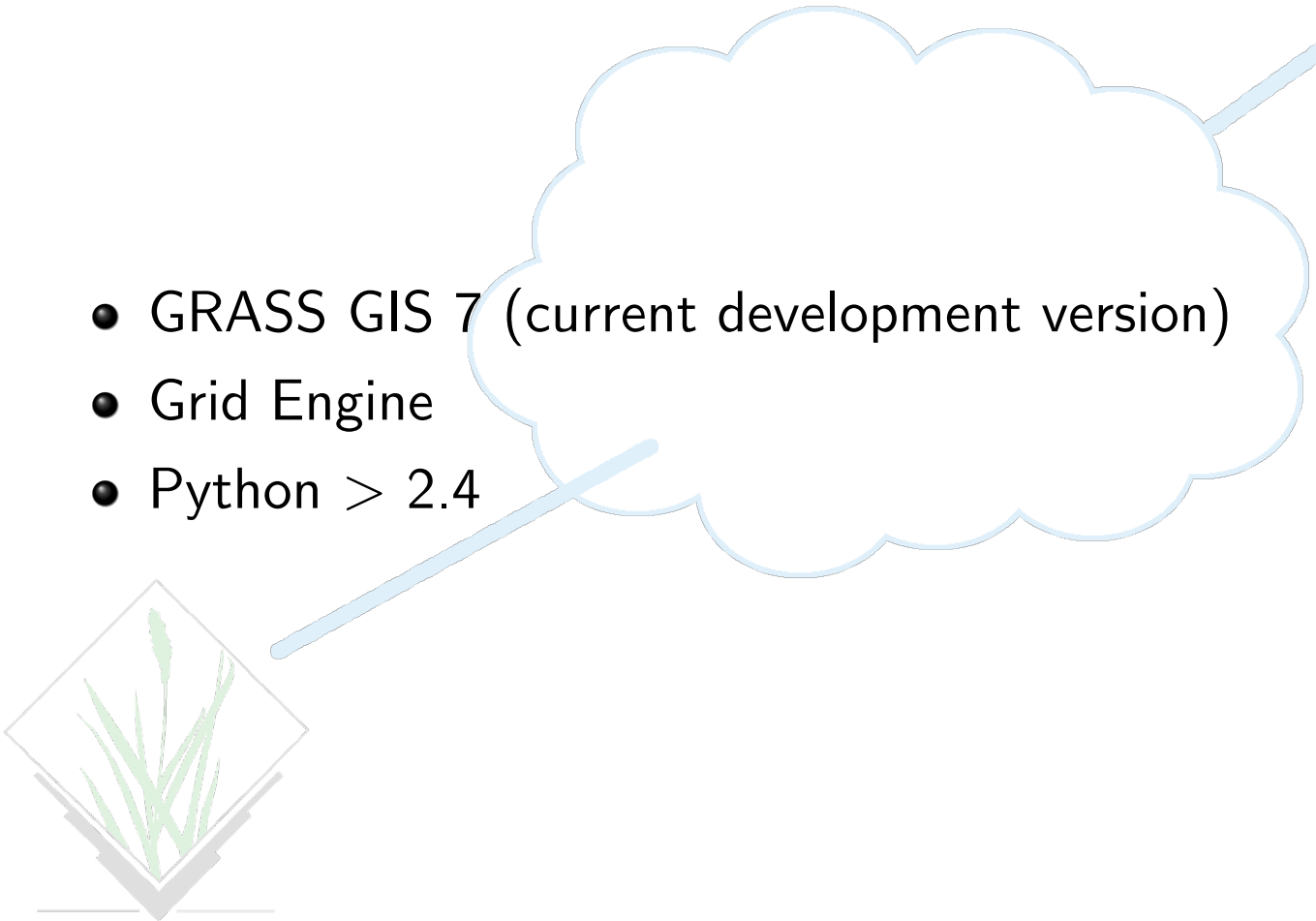
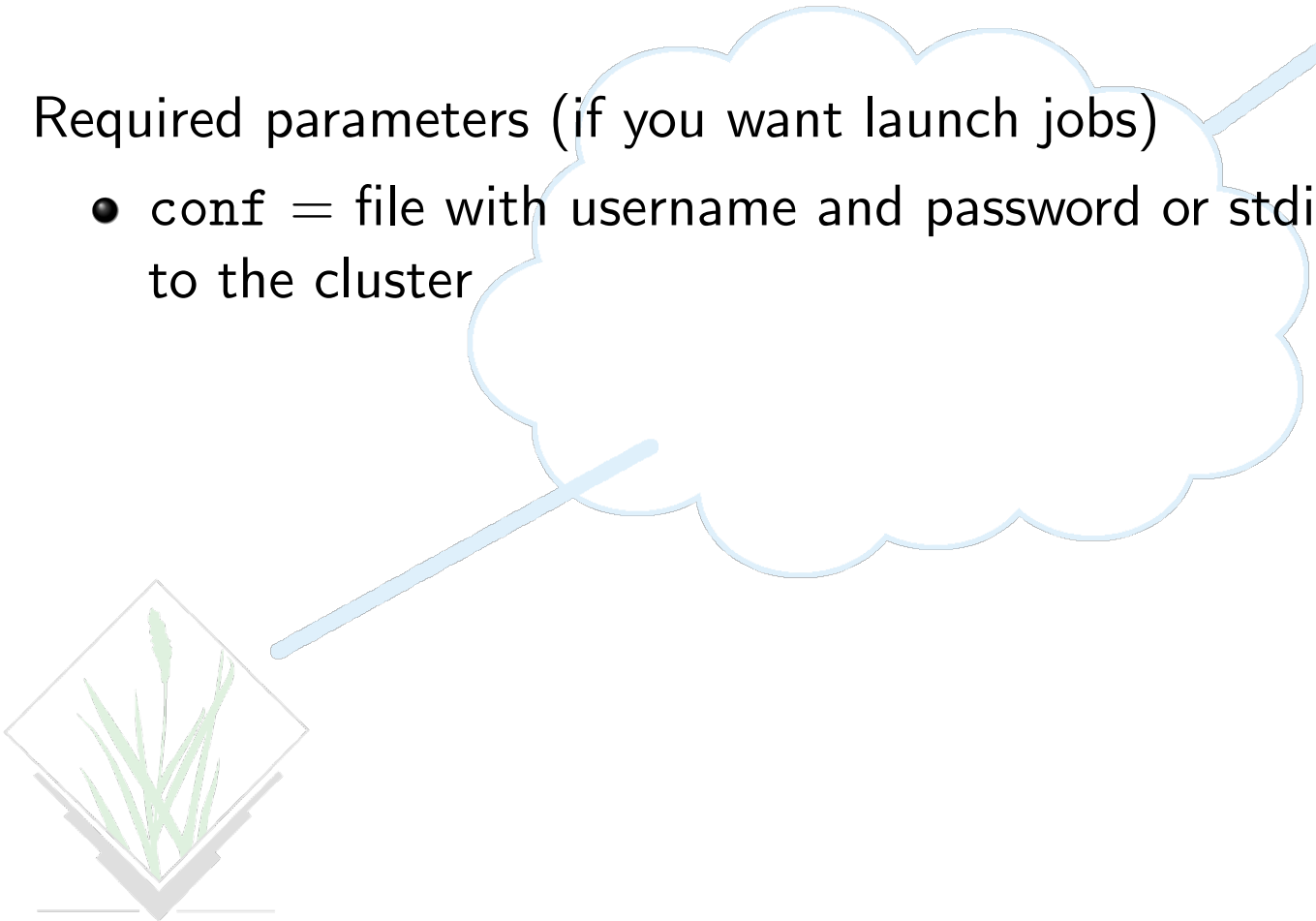


- GRASS GIS 7 (current development version)
- Grid Engine
- Python $>$ 2.4

Implementation: how does it work?



Required parameters (if you want launch jobs)

- `conf` = file with username and password or stdin to connect to the cluster

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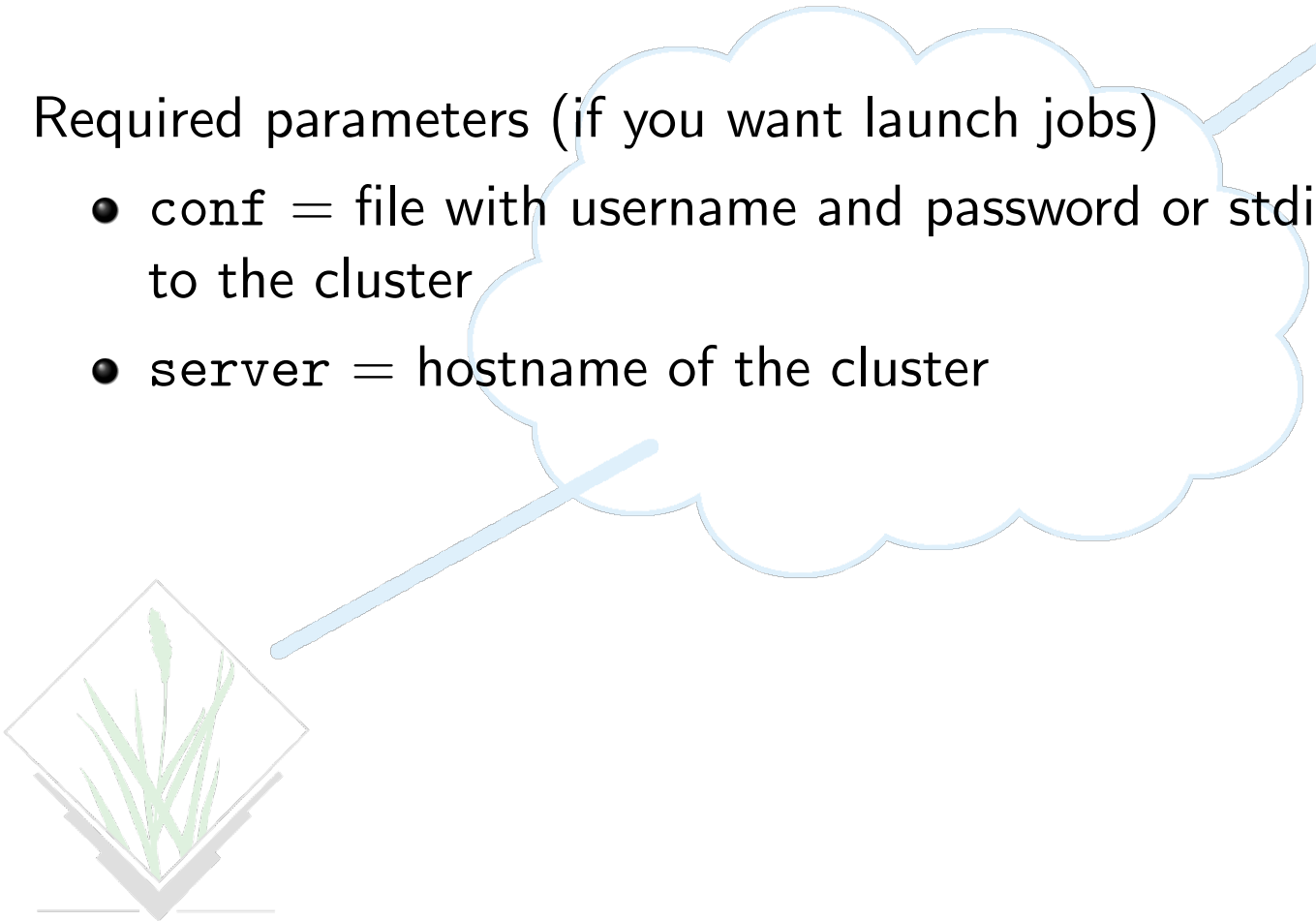

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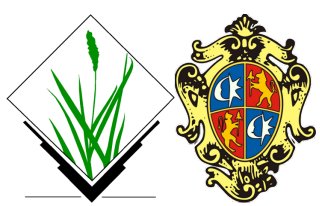
- `grass_script` = own GRASS GIS script



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qsub_script=test_launch_SGE_grassjob.sh grass_script=test_novariables.sh

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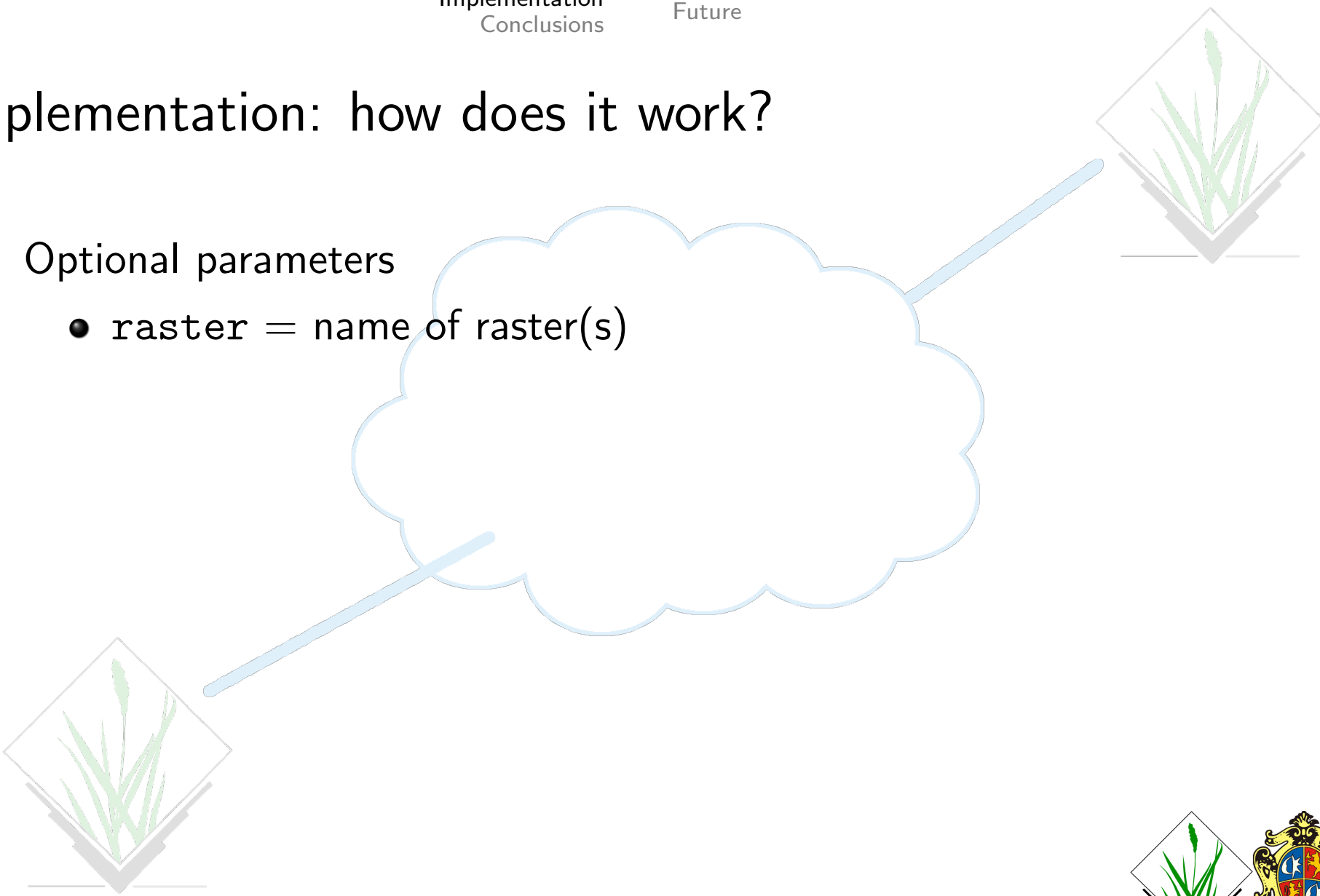

Optional parameters

- `raster` = name of raster(s)

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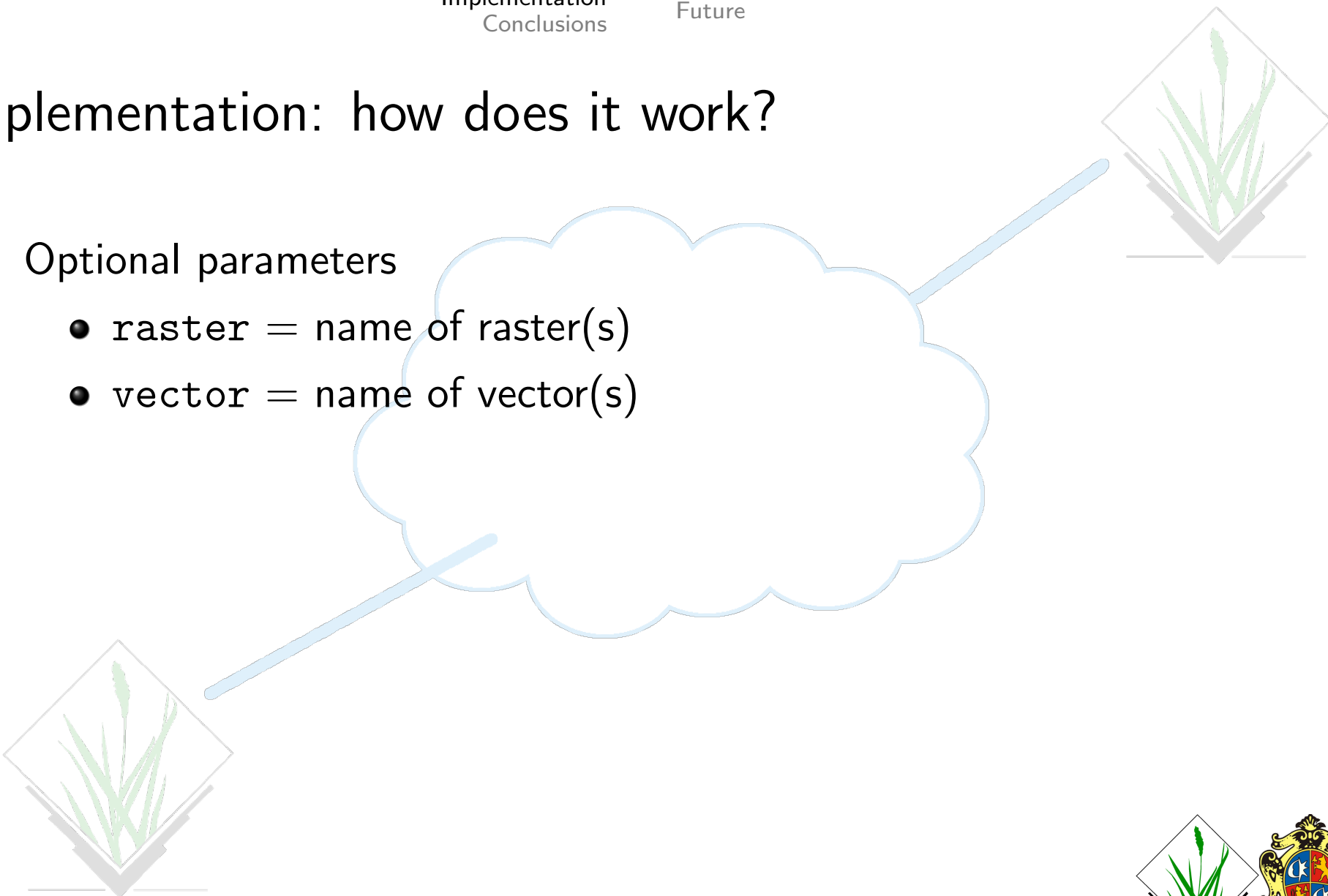

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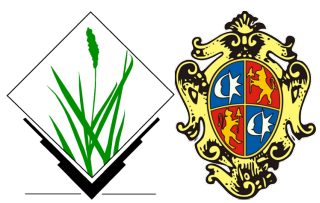

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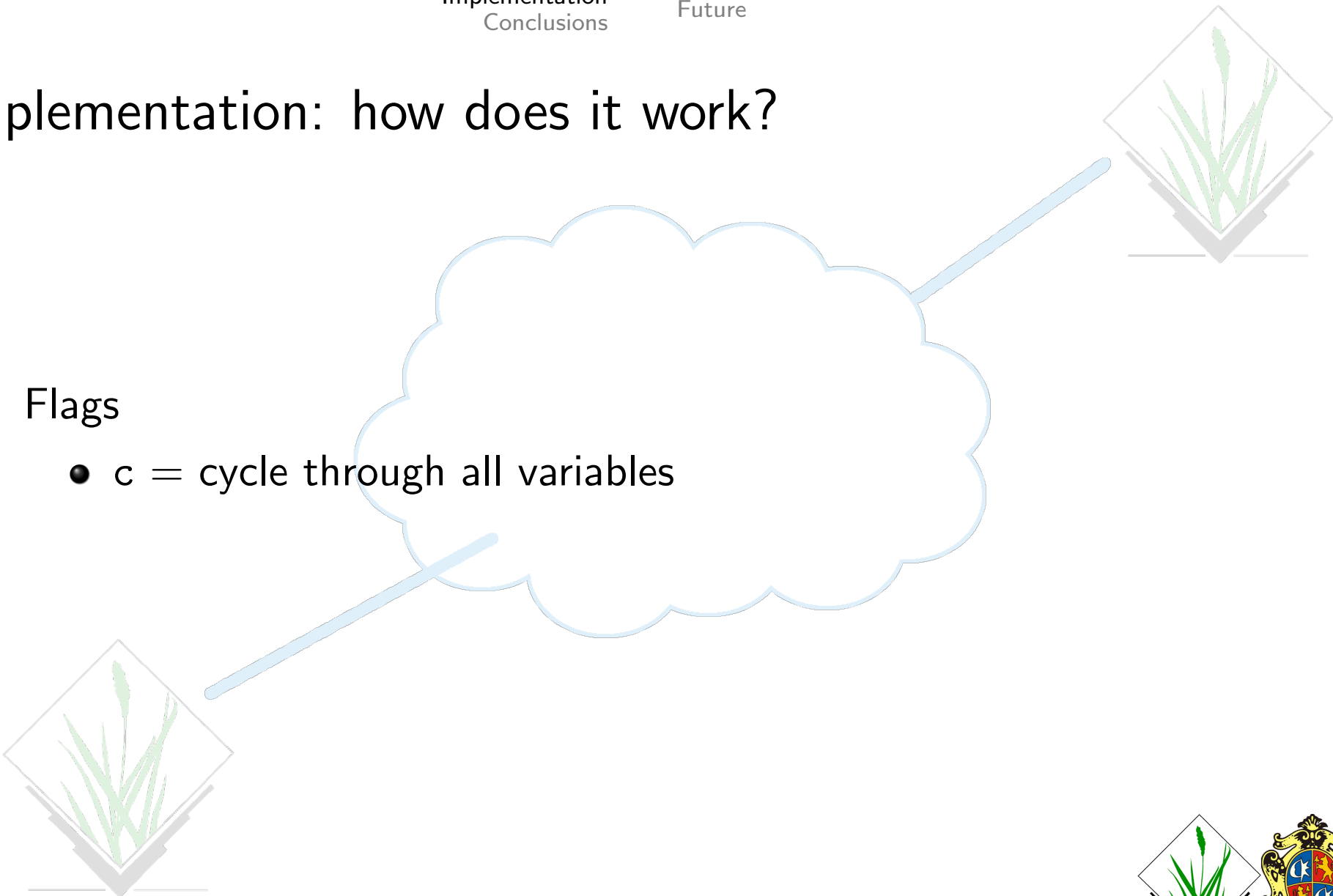
- `path` = path to the folder which must be accessible from cluster frontend and blades

Implementation: how does it work?



Flags

- c = cycle through all variables

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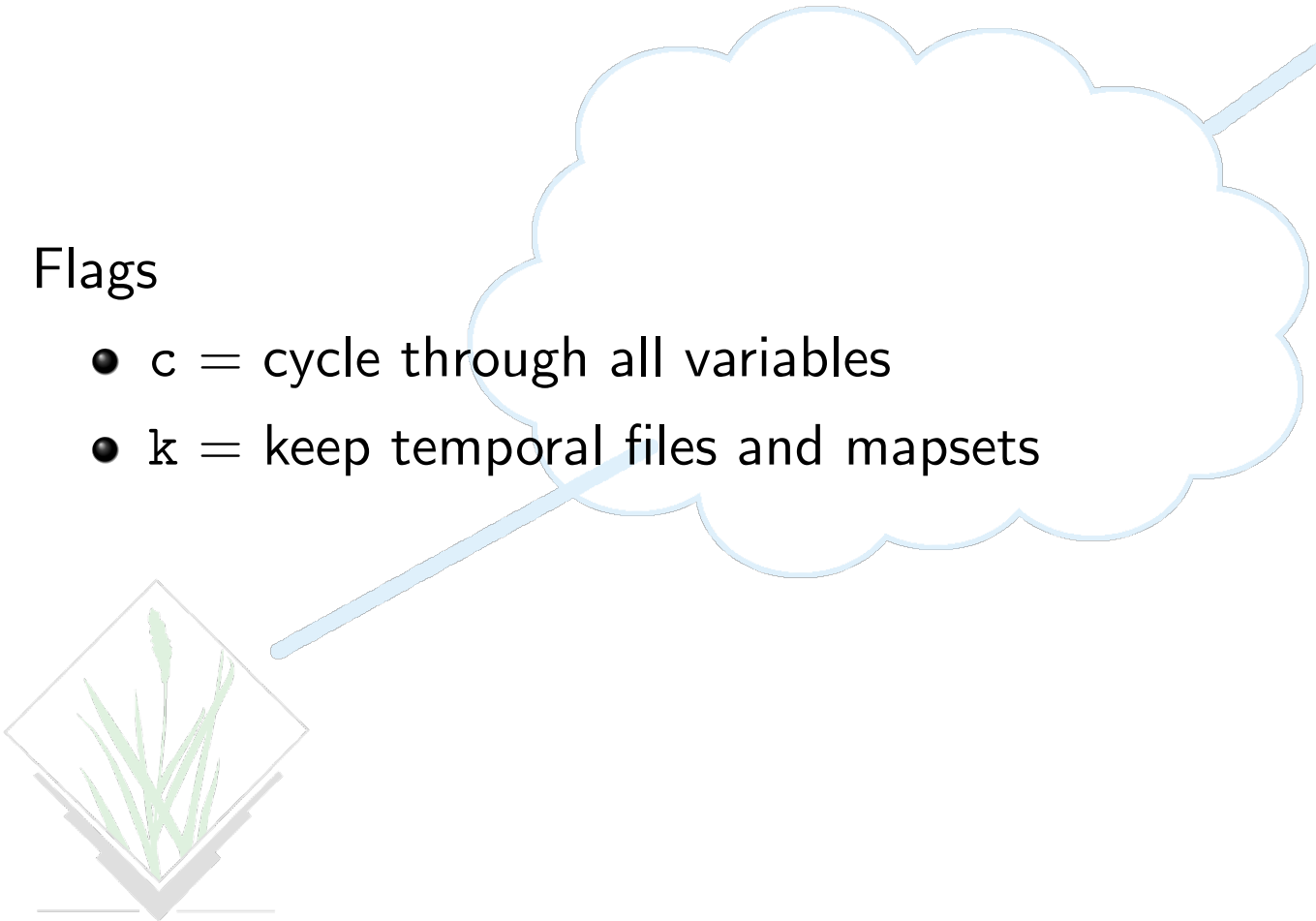

Flags

- `c` = cycle through all variables
- `k` = keep temporal files and mapsets

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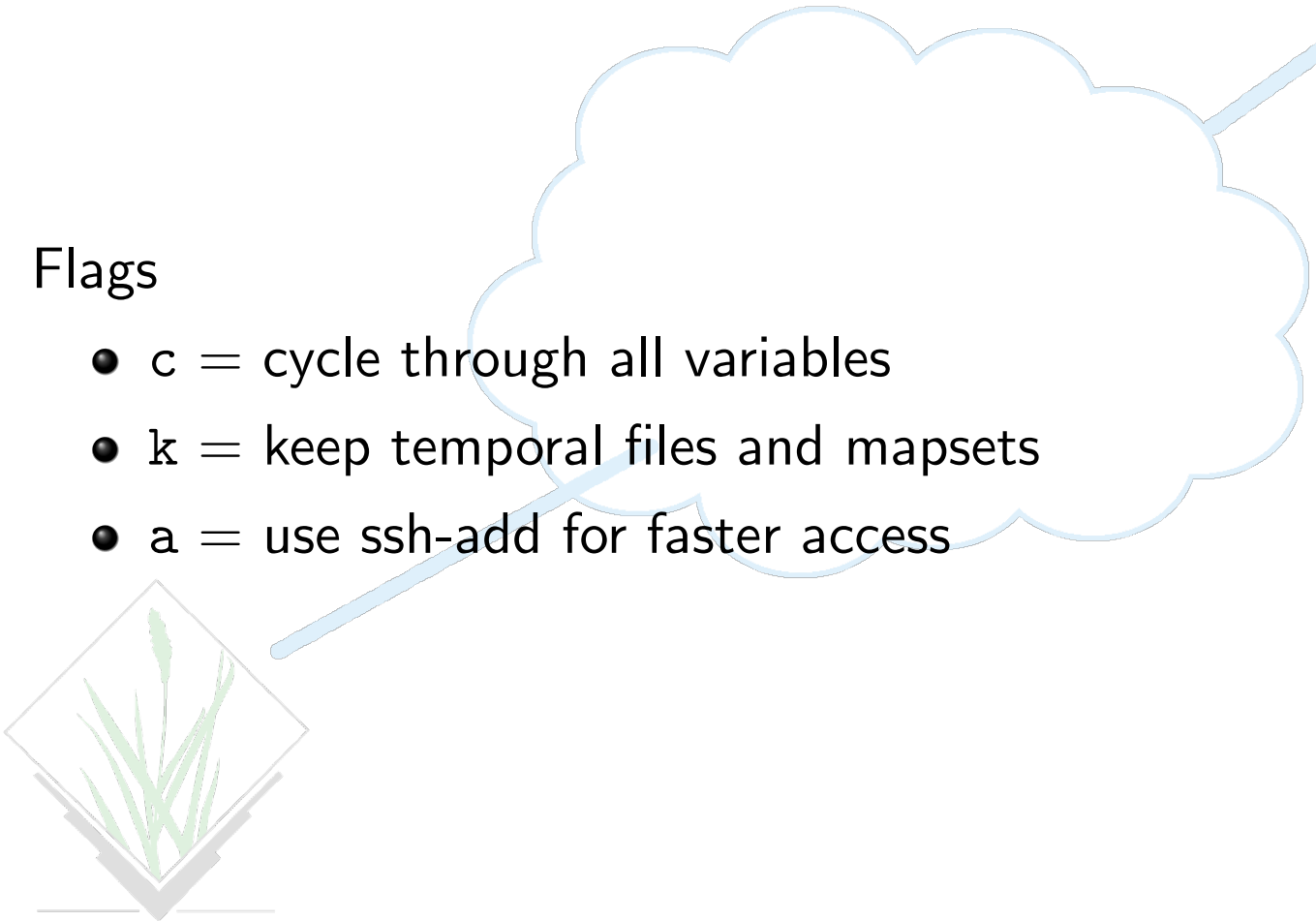


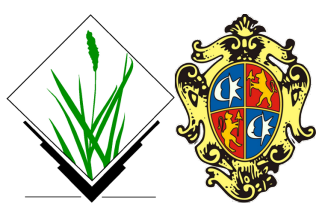
Flags

- c = cycle through all variables
- k = keep temporal files and mapsets
- a = use ssh-add for faster access

Implementation: more examples

North Carolina sample data

- r.texture example
  g.cloud conf=/tmp/passwd server=giscluster
  qsub_script=test_launch_SGE_grassjob.sh grass_script=test_onevariable_raster.sh
  variables="'TEXT' :
  ['asm','contrast','corr,var','idm','sa','se','sv','entr','dv','de','moc1','moc2']"
  raster=lsat7_2002_40



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- r.sun example

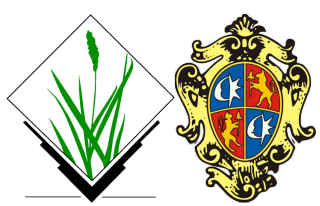
  g.cloud conf=/tmp/passwd server=giscluster

  qsub_script=test_launch_SGE_grassjob.sh grass_script=test_onevariable_sun.sh

  variables="'DOY' : [1,2,3,4,5,6,7,8,9,10]" raster=elevation

Implementation: more examples

- more variable example
  g.cloud conf=/tmp/passwd server=giscluster qsub_script=test_launch_SGE_grassjob.sh grass_script=test_morevariables_sun.sh variables="'NPOINT' : [10,20], 'BUFFERDIST' : [100,500]"
  use number point 10 with buffer distance 100; and number point 20 with buffer distance 500



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  use number point 10 with buffer distance 100; and number point 20 with buffer distance 500
- more variable example

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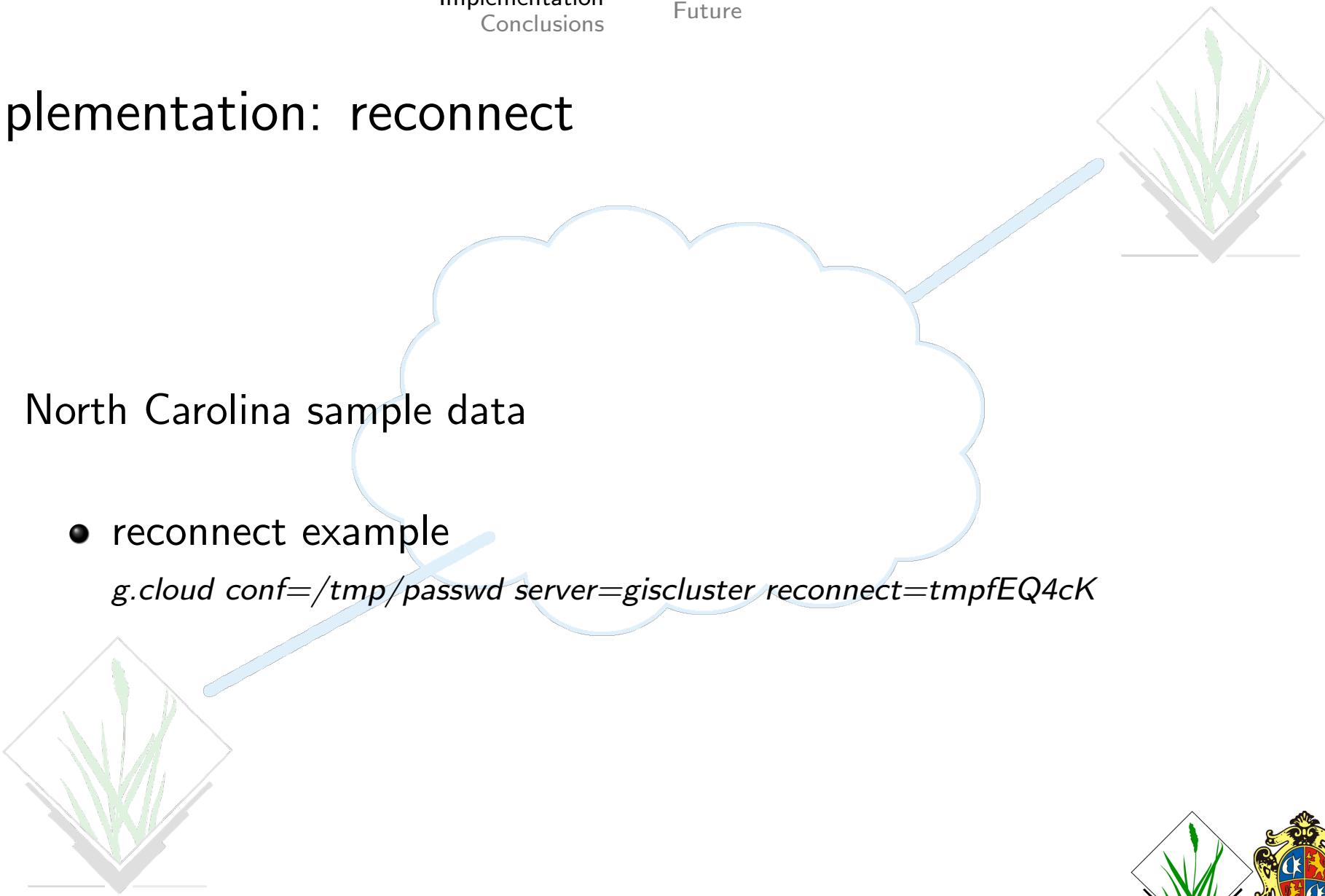
  variables="'NPOINT' : [10,20], 'BUFFERDIST' : [100,500]"

  use number point 10 with buffer distance 100 and 500; number point 20 with buffer distance 100 and 500

Implementation: reconnect

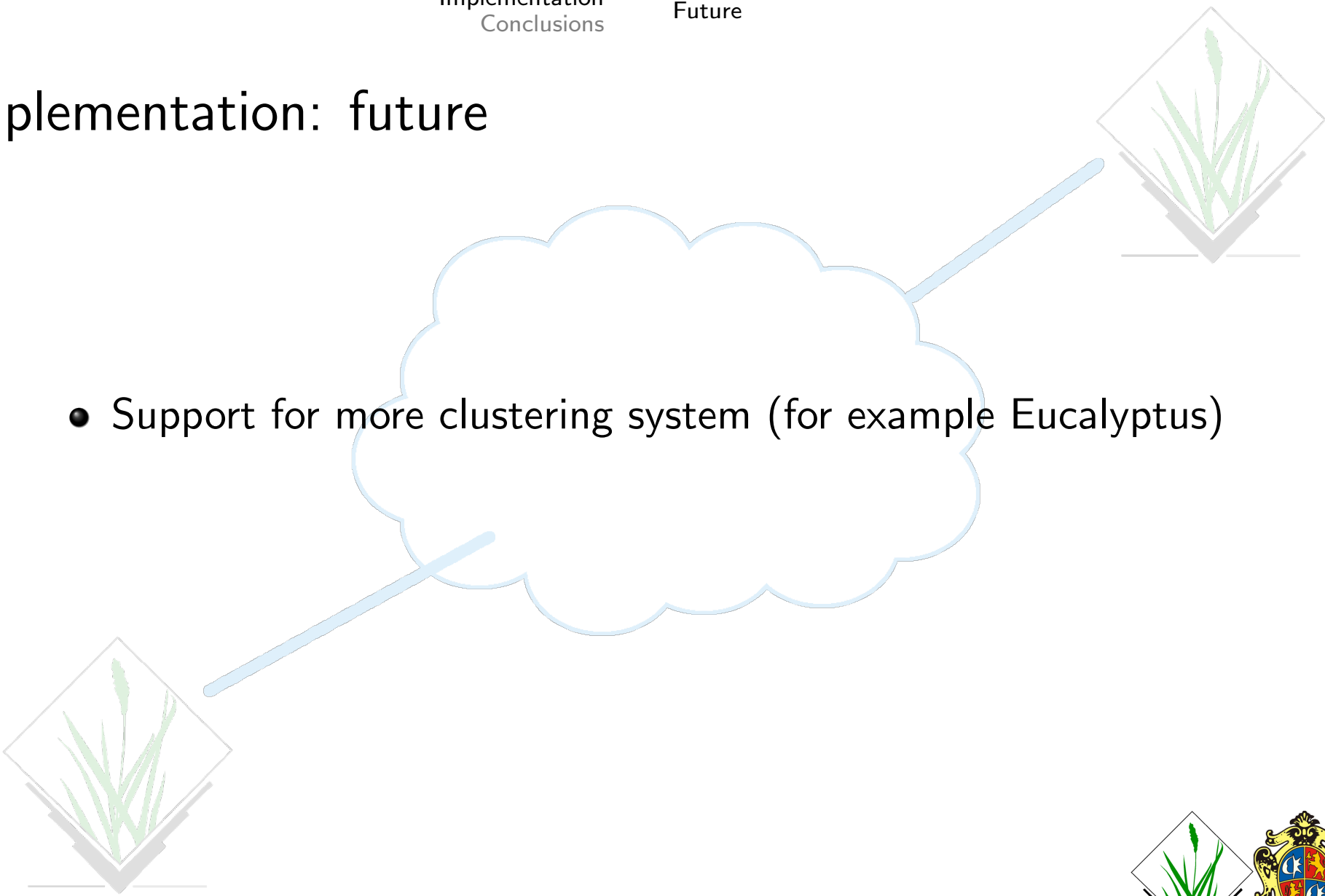


North Carolina sample data

- reconnect example

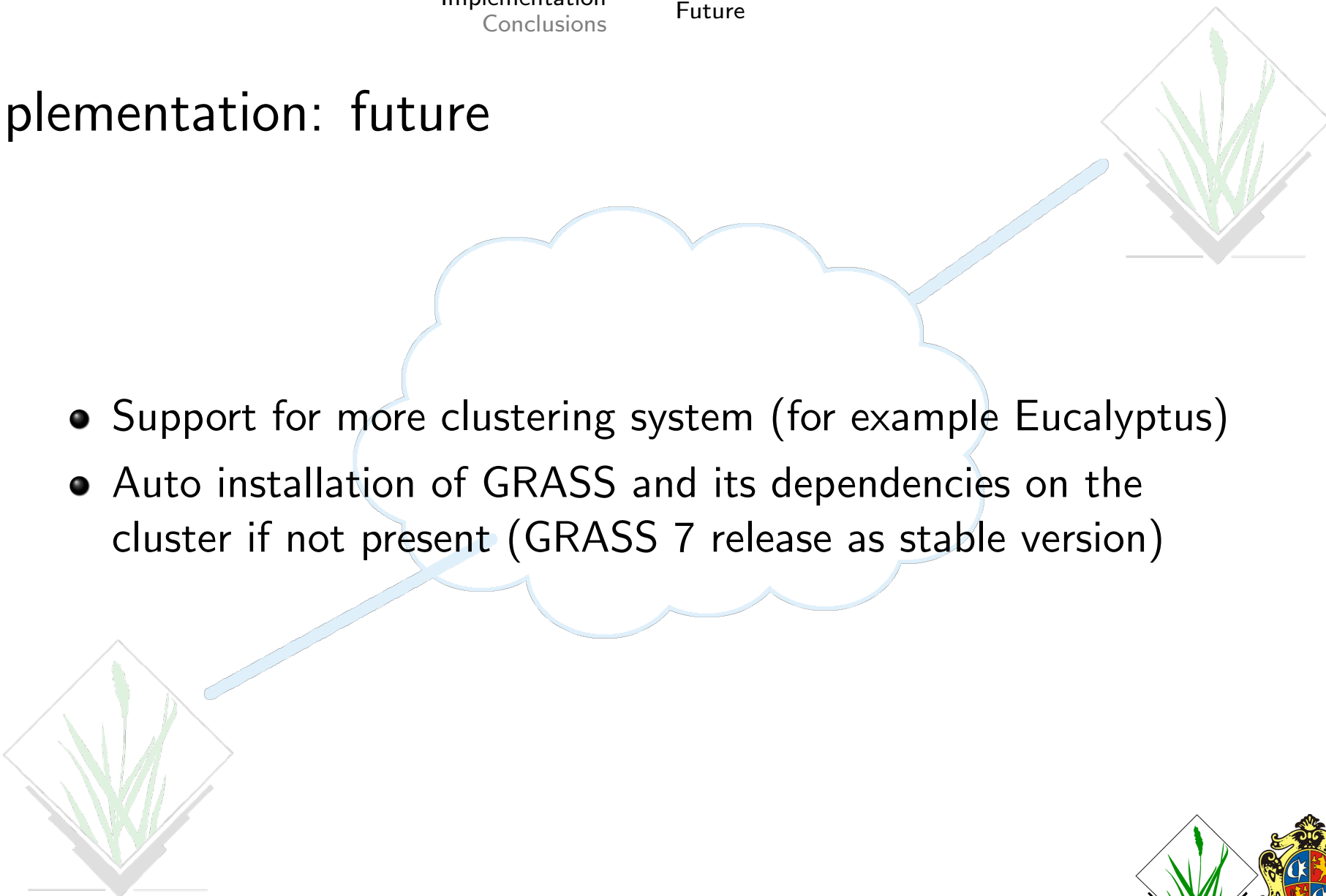
  g.cloud conf=/tmp/passwd server=giscluster reconnect=tmpfEQ4cK

Implementation: future



- Support for more clustering system (for example Eucalyptus)

Implementation: future



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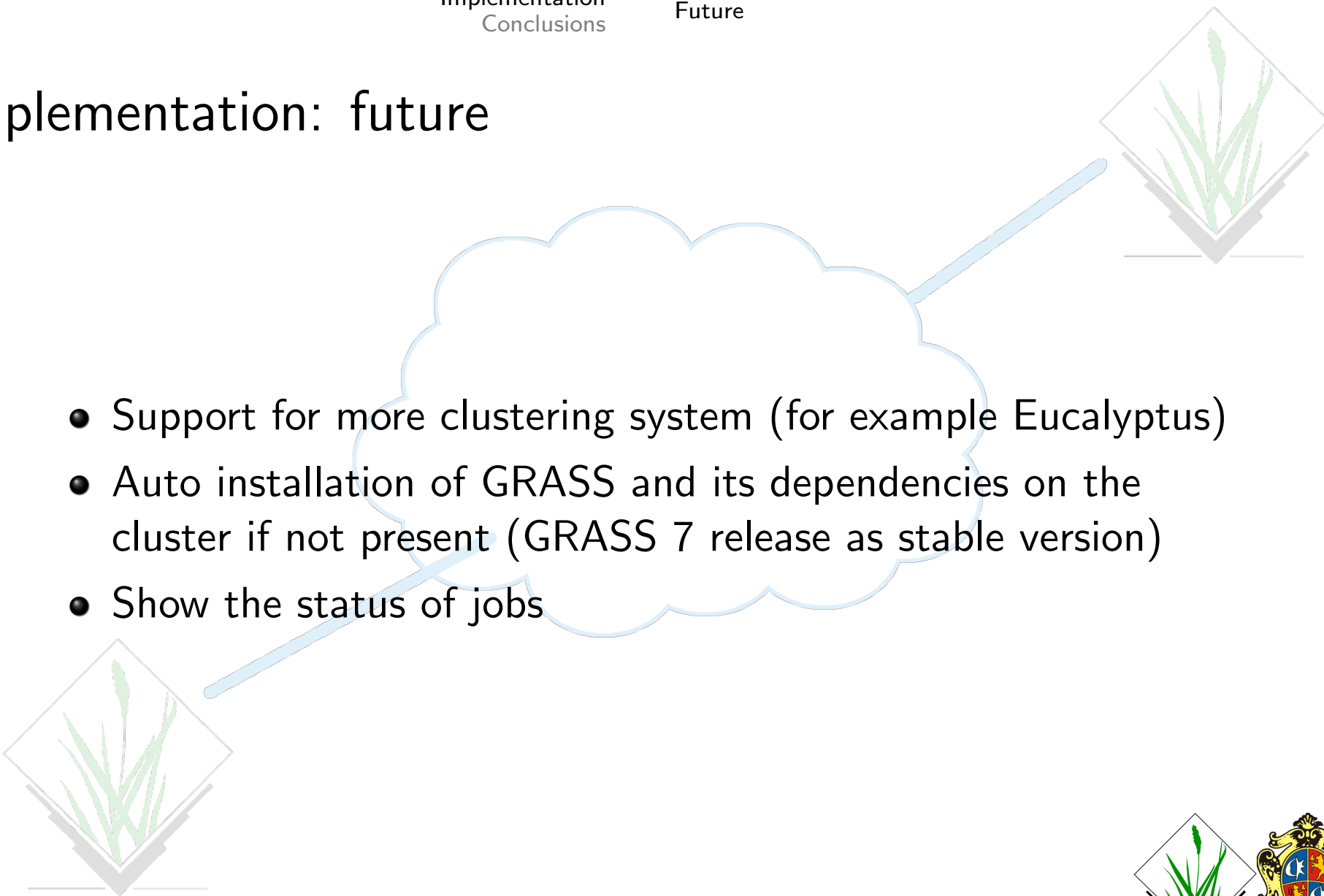
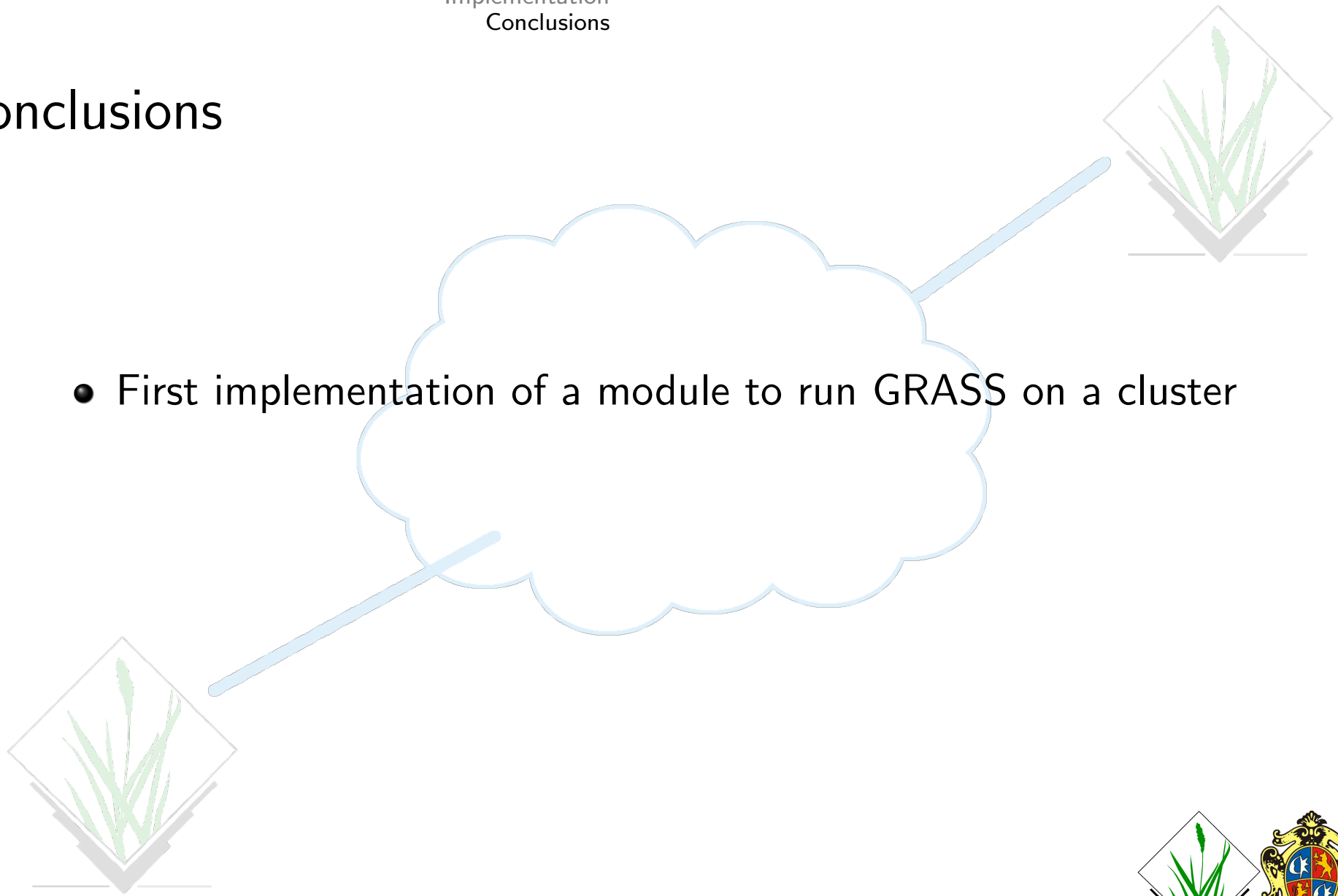


- Support for more clustering system (for example Eucalyptus)
- Auto installation of GRASS and its dependencies on the cluster if not present (GRASS 7 release as stable version)
- Show the status of jobs

Conclusions



- First implementation of a module to run GRASS on a cluster

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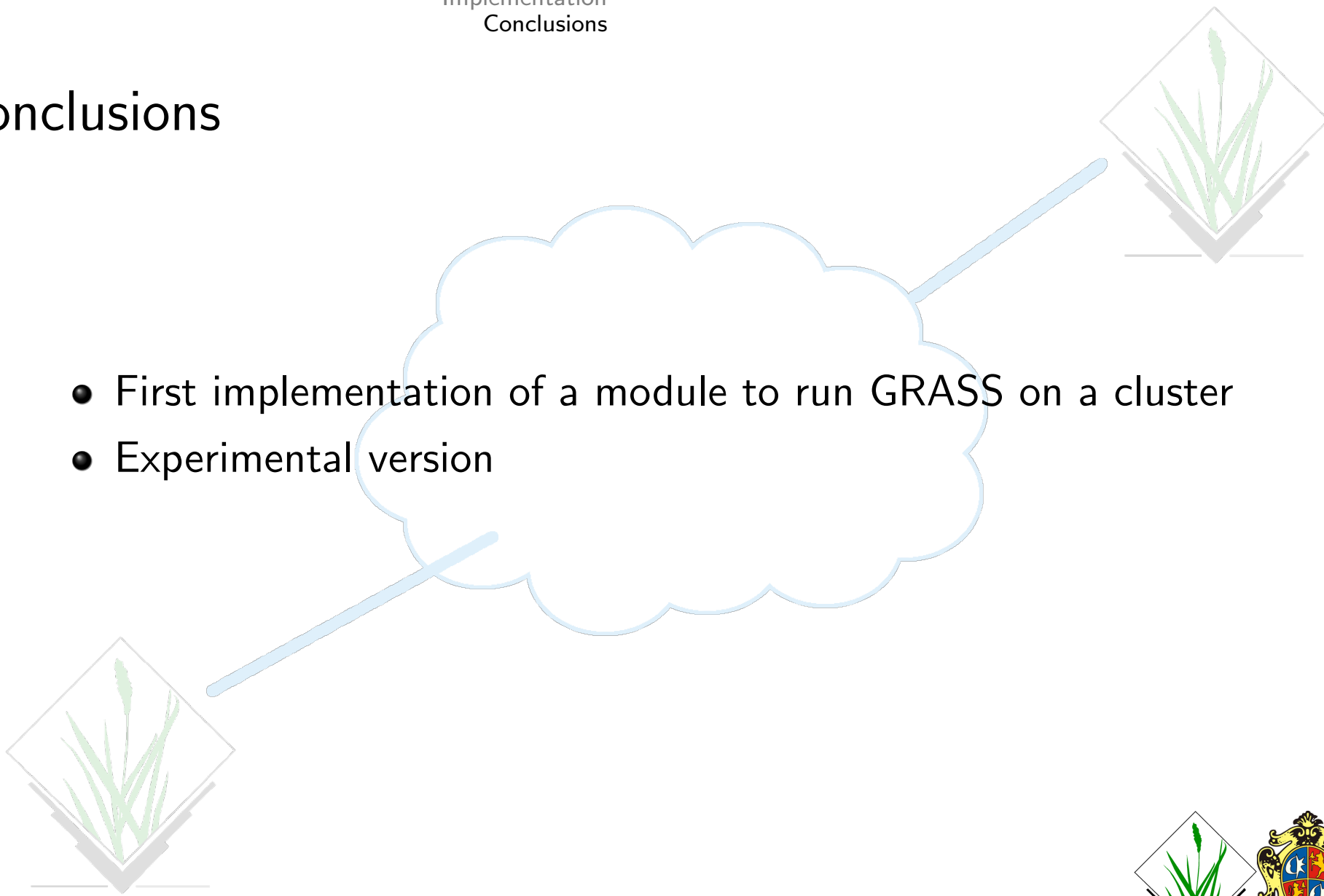

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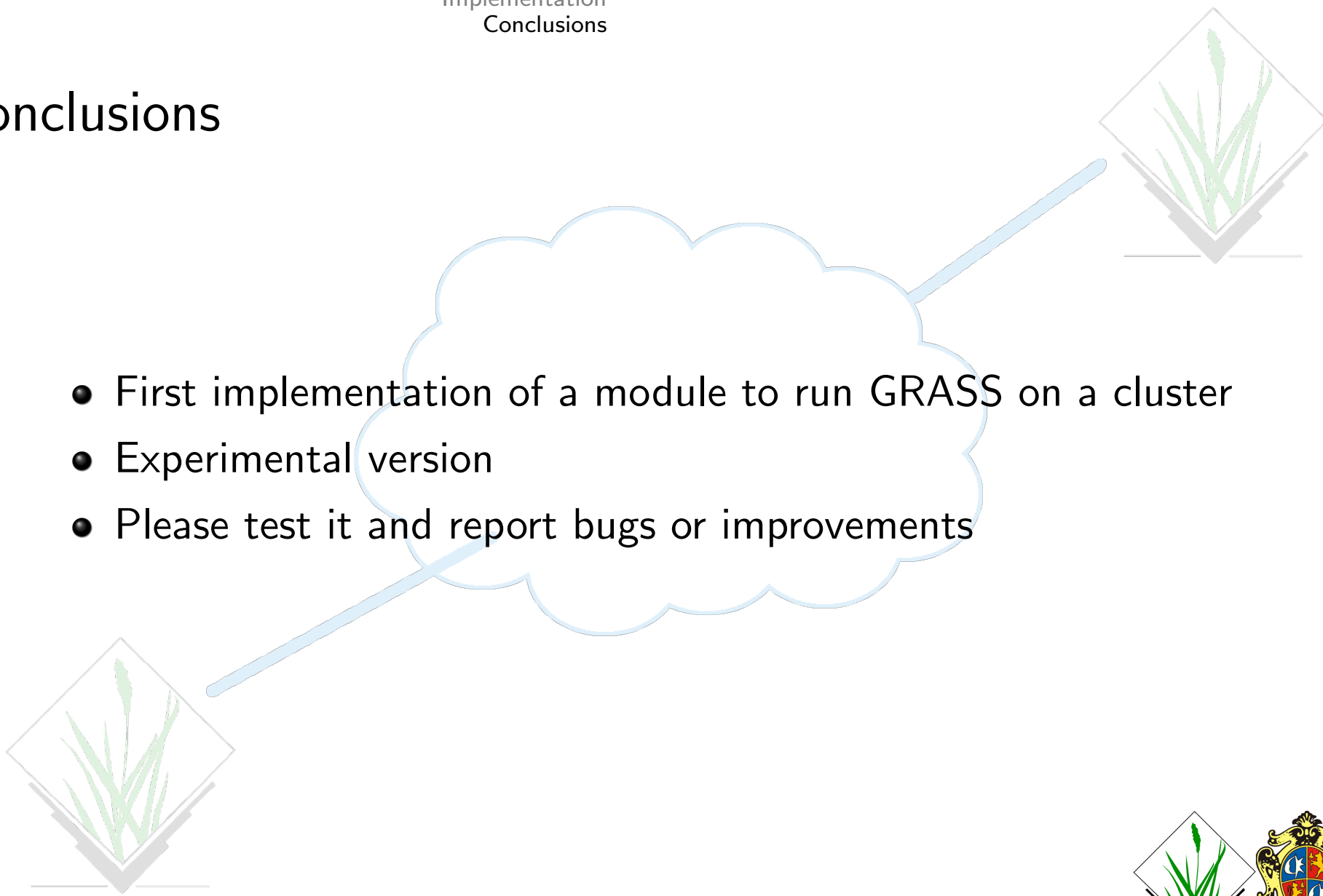

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- Please test it and report bugs or improvements

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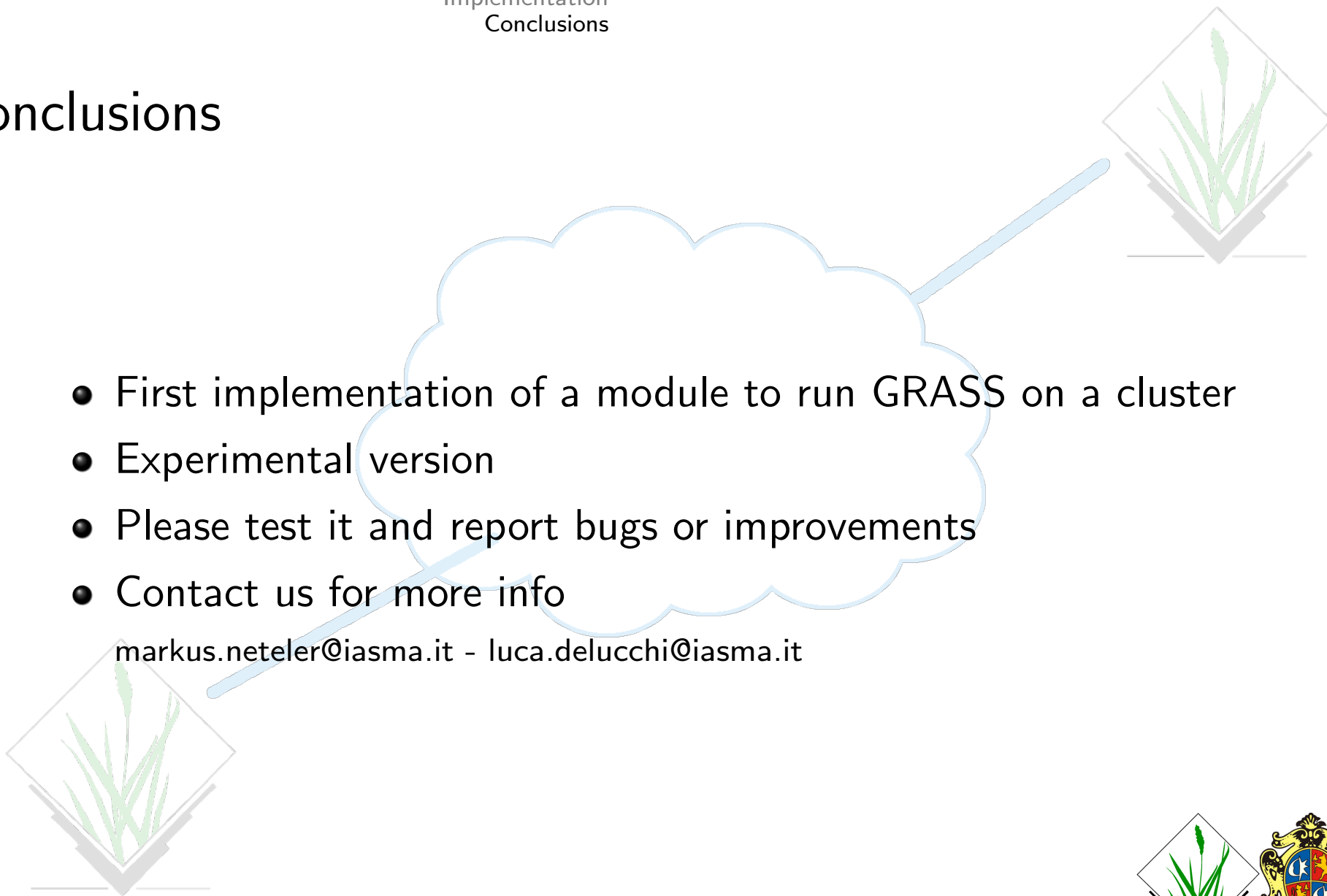

- First implementation of a module to run GRASS on a cluster
- Experimental version
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- Contact us for more info

markus.neteler@iasma.it - luca.delucchi@iasma.it

Conclusions

Thanks for your attention

gis.cri.fmach.it