NGS

National Grid Service

The National Grid Service User Accounting System

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Overview

- Introduction to the NGS
- The problem of accounting
- Possible solutions
- Our solution
- Difficulties and results
- Future work

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The National Grid Service

- The NGS is the UK's grid for academics
- Providing compute and data resources on the grid
- Providing help and support to those using the grid (any grid)
- The NGS collaborates closely with EGEE
- The NGS is led and coordinated by the STFC in collaboration with:
  - University of Manchester
  - University of Oxford
  - University of Edinburgh
  - White Rose Grid at the University of Leeds

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Current Status

- Over 650 registered users
- 4 core sites, 7 partner sites and 5 affiliate sites
- Will be the UK's National Grid Infrastructure (NGI)
- Some sites are already both NGS and EGEE sites:
  - Imperial
  - Glasgow
  - Oxford

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Grid Accounting

- Accounting for any system is important
- Pricing policies may be introduced to grids in the future
- JISC has recently funded a review of accounting and usage monitoring
- Issue many grids now face

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Grid policing

- Users are allocated *limited* resources
- Important to know how much of those resources have been consumed
- Users tend to go over quota even when monitored
- Need to ‘lock-out’ users who go over quota
- Retain integrity of application and peer-review process

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Our problem

- Situation at beginning of 2006:
  - Applications under go light-weight peer review process
  - Ability to monitor individual usage
  - Policies in place for usage
  - No tools to use the monitoring data to enforce the policies
  - Needed a system to enable us to manage users and enforce allocation policies

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Other solutions

- APEL (EGEE)
  - Accounting Processor for Event Logs
  - Accounting information such as CPU time, Wall Time and DN
  - Virtual Organisation emphasis with no individual policing
- TeraGrid
  - Monitoring available via command line
  - No architecture in place for automatic policing
- OGF
  - Resource Usage Service (RUS)
  - Stores monitoring information that can be queried
  - NGS has used a RUS since early 2006

No current solution met all the needs of the NGS – we needed our own solution

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Our Solution

- Resource usage data obtained by querying the Resource Usage Service (RUS) at Manchester
- RUS already in place and had functionality the NGS required
- Accounting system based on an Oracle database
- Information collected
  - User details
  - Application information
  - Account status
  - Resource allocation
  - Resource usage
- Usage and allocation is collated over all 4 sites
- Records historical information
- Records changes in Distinguished Name (DN)
- Based on OGF standards, extensible

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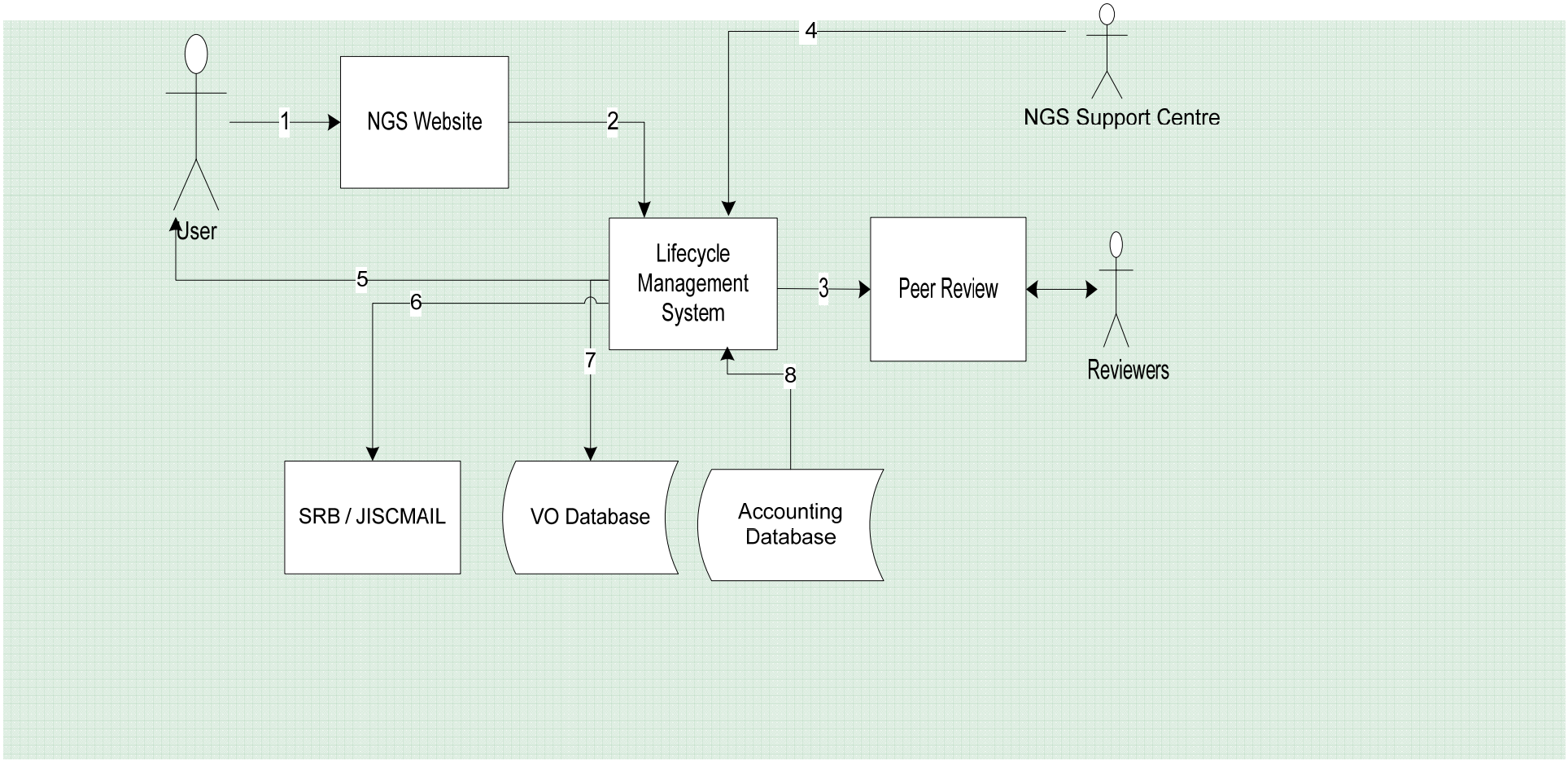

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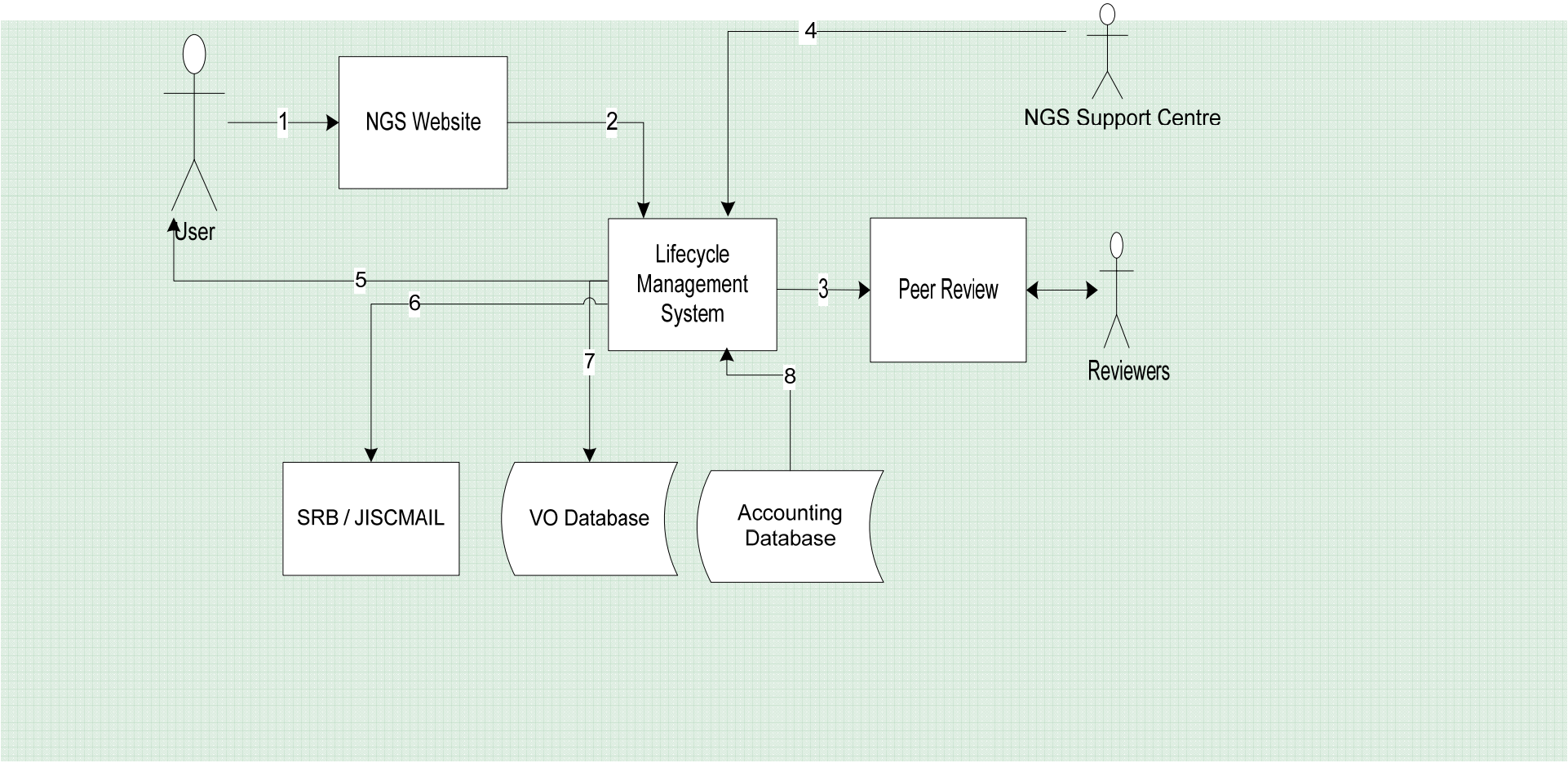

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Policing the NGS

- UAS queries the RUS every day for total CPU and disk space for every user
- A warning email is sent out when you reach 90% of your CPU allocation
- The account is automatically locked and an email sent when you reach 100% of your CPU allocation

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Policing the NGS (2)

- The Virtual Organisation Management Server queries the accounting database every hour
- Only populated with the DN of users whose account has ‘active’ or ‘unlocked’ status
- Users whose accounts are locked or pending are not included in the LDAP
- Maximum of hour before accounts are active again once they’ve been unlocked

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Policing the NGS (3)

- When an account is locked, you can apply for more resources
  - Via application form
  - Via your account details
- When your application is successful, your account is automatically updated with your new allocation and account is ‘active’ again
- An email is sent to you letting you know you’re back within your limits and the account is set to active again
- Your account will be active on all nodes within the hour

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Integration with other systems

- User Accounting System interacts with external systems as little as possible
- Recently incorporated:
  - Peer-review process into UAS
  - SRB account creation into UAS

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Accessing your details

- Users wanted to know how much of their allocation they had used
- https://www.ngs.ac.uk/useraccountinfo.php
- Certificate access to account details
  - Not supported by Oracle Apex
  - Needs script in front of it to take certificate details from browser
- Also provides ability to change contact details
- Renewals can be done through their own account

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NGS User

Apply Changes | Finish

Name	kathleen weeks
DN	/C=UK/O=eScience/OU=CLRC/L=RAL/CN=kathleen weeks
Address	
email address	k.m.weeks@rl.ac.uk
Institution	Rutherford Appleton Laboratory
Telephone	01235 445960
Account Status	Active
Application Date (if account is pending)	
Application Case	https://www.ngs.ac.uk/ops/privops/cases/ngs0228.html
Application Case Summary	

Resource Allocation

Resource	Allocated Limit	Used
CPU	2000	.006
Disk	20	0
SRB	20	0
Oracle	0	0

1 - 4

Renew Resources

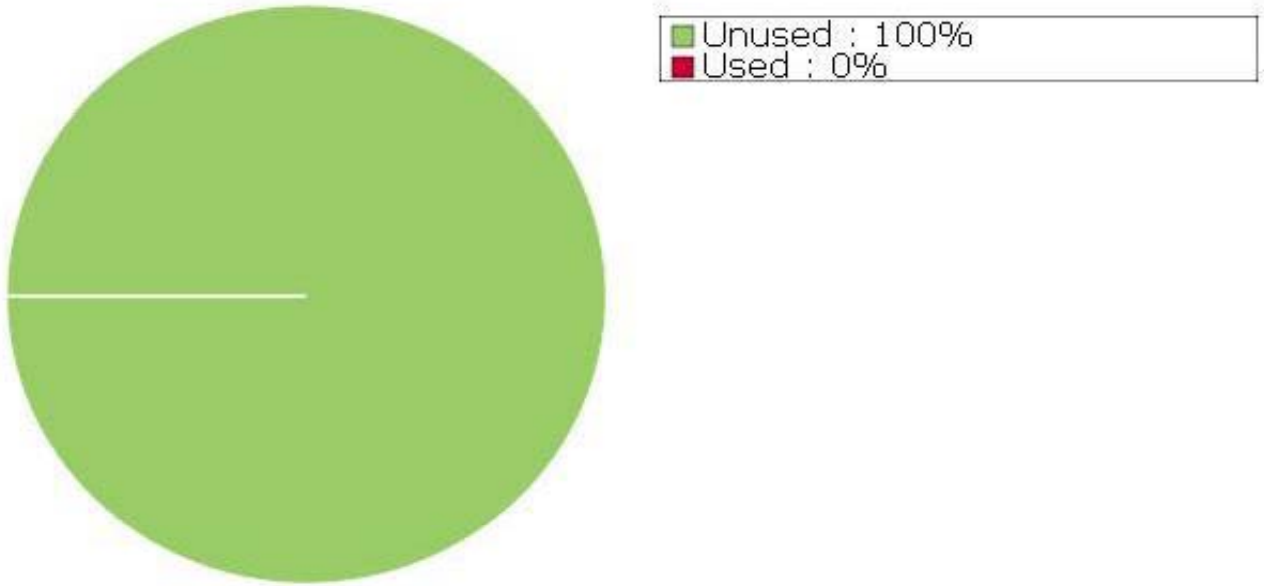
Resource Allocation

Resource	Allocated Limit	Used
CPU	2000	.006
Disk	20	0
SRB	20	0
Oracle	0	0

1 - 4

Renew Resources

My Resources



Using Oracle and Apex

- Oracle is robust, scalable and efficient
- RUS database is modified to store as a relational database
- Oracle is used for hosting projects on the NGS e.g. CPOSS data
- Already had system, expertise and experience
- Apex allows web forms and reporting to be done very quickly
- Apex also allows graphs to be produced dynamically

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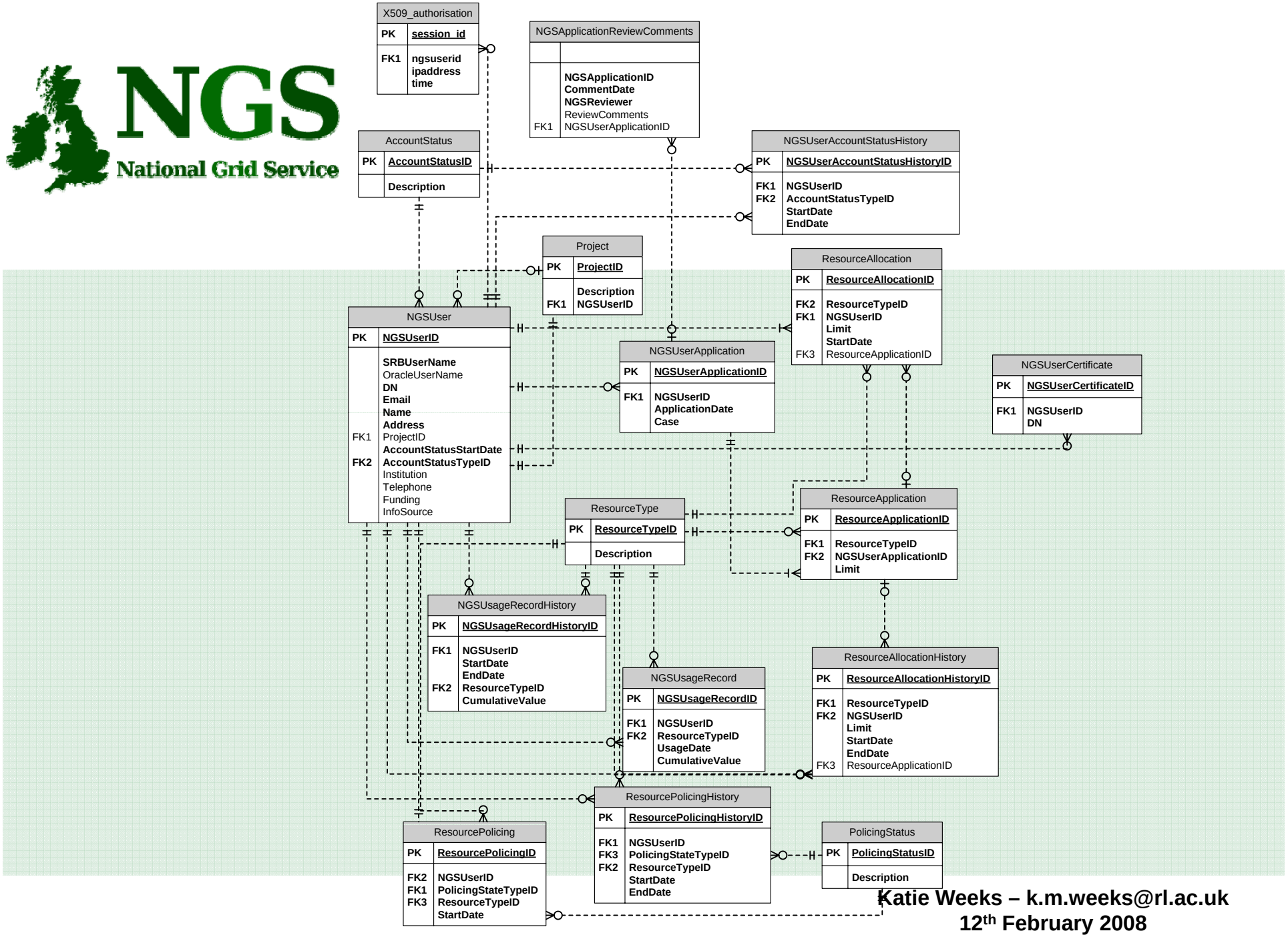

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Problems

- Limitation on field length restricted case entries and caused some problems when users wrote more than 2200 characters
- Oracle Apex doesn't support X509 certificate access – our own workaround had to be implemented for the user to access their account details
- Footprints was initially used for the peer-review process. Difficulties of synchronising two systems resolved with inclusion into the UAS

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Results

- Entered production in October 2006
- Begun locking out users at 10,000% over quota
- Gradually reduced to 100% of quota
- 79 accounts have been locked
- 75% have successfully reapplied
- Over 180 new users have applied using the system

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Future Work

- The UAS is continuously developing
- Development of RUS to allow partner sites to upload usage records
- Inclusion of monitoring and accounting of storage usage
- Extension to support Virtual Organisations
  - Accounting over a VO
  - Handle a VO as a single entity
  - Development work to account for individuals within a VO

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Summary

- The RUS in combination with Oracle and Apex offered the best solution for the NGS UAS
- Monitoring and policing accounts is all done automatically now
- Users can manage their own accounts
- Application process is handled automatically
- Room for expansion of the system

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Further information

- Talk to me after the presentation
- Visit the United Kingdom and Ireland Federation stand (Stand S4)
- Contact the NGS support centre support@grid-support.ac.uk
- Visit the NGS website www.ngs.ac.uk

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