Green Sustainable Data Centres

The Development of a Course to Support Sustainable Networked Science

Colin Pattinson
c.pattinson@leedsmet.ac.uk

Anda Counotte
anda.counotte@ou.nl

Sustainable IT
Brundtland 1987:
Sustainable development is a pattern of economic growth in which resource use aims to meet human needs while preserving the environment so that these needs can be met not only in the present, but also for generations to come.

PPP by CSR
People, Planet, Profit by Corporate Social Responsibility

Equilibrium: keep the cycles closed

Greening of IT
IT Life cycle: manufacture, use, disposal
- Global CO₂ emission of IT equal to aviation industry
- E-waste
- Hazardous substances
- Use of scarce and nonrenewable resources

Greening by IT
Using IT to improve sustainability of human activities

E-Infranet
E-Science support Integration of the European Research Area
Areas of special interest:
- Environment and Green Computing
- Cloud Computing
- Openness

Need for education and training

Future project
The EISTER consortium plans to develop a European Master of Science course. We look for:
- Partners
- Funding

Please join us on http://portal.ou.nl/web/green-sustainable-data-centres

Introductory course

Characteristics
- Open Education Resources
- Free downloadable
- Suitable for self study
- Suitable for blended learning

Overall learning outcomes
- EU Code of Conduct on data centres is framework of course
- Audit of a data centre, following the procedure of the Code of Conduct
- Recommendations for improvement measures

Method to develop the course

Back casting
- Learning outcomes
- Framework
- Homework → Course Project
- Content of the chapters

Active learning for distance education
- Reflection questions
- Self-assessment questions
- Margin text

<table>
<thead>
<tr>
<th>Topic</th>
<th>Author</th>
<th>University</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction to programme</td>
<td>Anda Counotte Colin Pattinson</td>
<td>Open Universiteit (The Netherlands) Leeds Metropolitan University (UK)</td>
</tr>
<tr>
<td>Introduction to Green IT</td>
<td>Colin Pattinson Ah-Lian Kor</td>
<td>Leeds Metropolitan University (UK)</td>
</tr>
<tr>
<td>Data Centre Facilities</td>
<td>Joono Toolonen</td>
<td>Kajaani University of Applied Sciences (Finland)</td>
</tr>
<tr>
<td>IT Equipment</td>
<td>Johan De Gelas</td>
<td>University College of West Flanders (Belgium)</td>
</tr>
<tr>
<td>Operating Systems &amp; Virtualisation</td>
<td>Johan De Gelas</td>
<td>University College of West Flanders (Belgium)</td>
</tr>
<tr>
<td>Measurement and Control</td>
<td>Damian Dalton</td>
<td>University College Dublin (Ireland)</td>
</tr>
<tr>
<td>Data Centre Infrastructure Management</td>
<td>Damian Dalton</td>
<td>University College Dublin (Ireland)</td>
</tr>
<tr>
<td>Checklist Data Centre Visit</td>
<td>Cesar Gomez Martin</td>
<td>CenITI (Centro Extremeno de Investigacion Tecnologica y Supercomputacion) and University of Extremadura (Spain)</td>
</tr>
<tr>
<td>Legal and Regulatory Framework</td>
<td>Colin Pattinson Ah-Lian Kor</td>
<td>Leeds Metropolitan University (UK)</td>
</tr>
<tr>
<td>Greening by IT</td>
<td>Paulo Carreira Carlos A. Silva</td>
<td>IST, Universidade de Lisboa (Portugal)</td>
</tr>
<tr>
<td>Course Project</td>
<td>Ilmars Slaidins</td>
<td>Riga Technical University (Latvia)</td>
</tr>
</tbody>
</table>

The project team visits the CenITI Data Centre