Department of Computer Science and Engineering

Assignment 01
Green Education

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Submitted To

Course Instructor: **Amit Mandal**
Lecturer
Department of Computer Science & Engineering
East West University

Prepared by

Name	ID
B. M. Shahria Alam	2021-3-60-016
Umma Habiba Ahmed	2021-3-60-047
Sidratul Moontaha	2021-3-60-048

Introduction :

Green Education is an educational framework that focuses on fostering environmental awareness and sustainable practice. It mostly highlights teaching the general public about the importance of observing natural resources, reducing ecological imbalance, and the significance of our ecosystem. It integrates the principles of renewable energy literacy on climate change and how to be environmentally conscious. One of the significant benefits is the promotion of adopting habits such as recycling, conserving energy, and supporting renewable resources.

Domain: Green Education, Paper #1 — A Cloud-Oriented Green Computing Architecture for E-Learning Applications

Problem: The escalating energy consumption and carbon emissions of cloud-based data centers impact the environmental sustainability of e-learning applications.

Statement: The growing energy consumption and environmental impact of cloud-based data centers are critical issues. These concerns affect the efficiency of cloud infrastructure and contribute significantly to carbon emissions. E-learning, which is increasingly moving to cloud platforms, must address these challenges to minimize environmental impact without compromising performance.

Key Components:
- **Green Resource Allocator**: Manages the distribution of tasks to cloud services that minimize carbon emissions.
- **Middleware**: Facilitates the management and scheduling of resources, ensuring that cloud providers offer services with the least energy consumption.
- **Virtual Machines (VMs)**: Multiple VMs can be dynamically started and stopped to meet demand, optimizing resource use and reducing energy consumption.
- **Energy Monitoring**: A key part of the system is the Carbon Emission Directory, which tracks energy efficiency and provides data on power usage and cooling efficiency of cloud services.
- **Cloud Providers' Incentives**: Cloud service providers are encouraged to reduce their carbon footprint by offering energy-efficient services.

Objective:
- To reduce the carbon footprint of cloud computing used in e-learning.
- To design an energy-efficient cloud architecture without sacrificing performance or scalability.
- To offer an environmentally friendly, cost-effective solution for e-learning systems.

Domain: Green Education, Paper #3 — Implementing Green Education of Urban Families in Beijing

Problem: In Beijing, urban families' emotional disconnect from agricultural production and

food safety leads to unsustainable consumption habits.

Statement: In Beijing, escalating food safety concerns leave urban families uncertain about the quality of their food. This research bridges the gap in family-centered green education, where children participate in agricultural activities to develop an emotional connection with both rural producers and the land. The study empowers urban families to embrace sustainable food production and environmental care, while addressing the disconnect between urban consumers and rural food producers. By promoting collaborative food safety and green technology, this model offers a scalable solution for urban regions facing similar challenges.

Objective:

- To enhance ecological awareness and foster emotional connections between urban families and their environment, promote sustainable consumption, and improve food safety practices.
- To involve families in participatory farming activities, equipping them with practical knowledge and sustainable agriculture skills, while strengthening the bond between urban consumers and rural producers.

Domain: Green Education, Paper #5 — An E-learning System in Malaysia based on Green Computing and Energy Level

Problem: The increasing energy consumption and environmental impact of cloud-based systems in e-learning platforms create challenges for sustainability, with the need for eco-friendly alternatives to support growing energy demands.

Statement: As cloud-based e-learning systems gain traction in Malaysia, their energy consumption and environmental footprint have become significant concerns. This paper explores the application of green computing in e-learning, highlighting the energy efficiency of green computing compared to conventional computing systems. The research shows that green computing not only reduces energy consumption but also lowers carbon emissions, offering a sustainable solution for the e-learning sector without compromising performance. The results demonstrate a potential energy reduction of 30% when using green computing approaches.

Key Components:

- **Green Computing**
  Focus on optimizing hardware, software, and network resources to reduce power consumption.
- **Energy Efficiency Monitoring**
  Using tools like **IBM Tivoli** for monitoring resource usage and energy consumption.
- **Dynamic Resource Utilization**
  Virtual machine migration and cloud resources optimization to reduce energy consumption.
- **Cloud Computing**
  The research evaluates cloud-based systems and compares their energy consumption with traditional e-learning platforms.

- **Cost and Environmental Benefits**
  Green computing is shown to offer both **economic** and **environmental** benefits.

Objective:
- To reduce the energy consumption and carbon footprint of e-learning systems by implementing green computing techniques in cloud infrastructure.
- To design a cloud-based green computing architecture that minimizes energy consumption while maintaining the scalability and performance of e-learning applications.

Domain: Green Education, Paper #6 — Assessing University Students' Attitude toward Green Computing Practices

Problem: University students' attitudes toward green computing are crucial for promoting sustainable practices in academic environments. However, varying levels of awareness and engagement, particularly between genders, contribute to inconsistent adoption of green computing practices, which in turn impact overall energy efficiency and sustainability.

Statement: The increasing global concern over environmental issues calls for an understanding of university students' attitudes toward green computing. This study examines students' perceptions and behaviors regarding energy-efficient computing, with the goal of assessing their awareness and intention to adopt green computing practices. The research found that gender plays a significant role, with female students exhibiting a more positive attitude toward environmental sustainability compared to their male counterparts. These findings underline the importance of targeting both awareness and education to enhance green computing adoption in university settings.

Key Components:

- **Green Computing Practices**
  The responsible use of resources like computers, peripherals, and energy-efficient hardware to reduce environmental impact.
- **Gender Influence**
  A key finding is that female students demonstrate more concern and intention to adopt green computing practices.
- **Attitudinal Survey**
  Students' attitudes were measured using a Likert-scale questionnaire, with findings showing that the majority support green computing but vary in practical implementation.
- **Behavioral Gap**
  Despite high awareness, a significant gap exists between students' attitudes and actual energy-saving behaviors.
- **Recommendations for Awareness Programs**
  Universities should create campaigns to increase green computing awareness and integrate sustainability into the curriculum.

Objective:

- To assess university students' attitudes toward green computing and identify the factors influencing their intention to adopt energy-efficient practices.
- To determine the impact of gender on students' attitudes and behaviors regarding green computing in university settings.

Domain: Green Education, Paper #10 — Green University Initiatives in China: A Case of Tsinghua University

Problem: The rapid industrialization and urbanization in China have resulted in significant environmental challenges. Universities, being key players in educating future leaders, must contribute to sustainability through **green initiatives**. However, despite efforts, many universities struggle to implement holistic sustainability practices that integrate environmental, social, and economic dimensions.

Statement: Tsinghua University, as a pioneer in China's green university movement, launched its green university initiative in 1998 to align with the country's sustainable development goals. This initiative focuses on green education, green research, and green campus to promote environmental sustainability. The initiative has achieved significant progress but faces challenges such as limited attention to social justice, fragmented coordination, and the lack of effective communication and assessment mechanisms. Tsinghua's model has inspired other universities in China, making it a key reference for further development of green education in higher learning institutions.

Key Components:

- **Green University Framework**
  One principle (Green University) and **three dimensions** (green education, green research, and green campus) structure the initiative.
- **Green Education**
  Integrates sustainability into curricula, internship programs, and social responsibility initiatives, aiming to instill environmental awareness among students.
- **Green Research**
  Promotes sustainability in research, encouraging the integration of environmental considerations into academic and practical projects.
- **Green Campus**
  Involves creating an ecologically sustainable campus with improved landscaping, energy-saving measures, water conservation, and waste reduction.
- **Interdisciplinary Approach**
  Encourages collaboration across various academic fields, ensuring a comprehensive approach to sustainability.

Objective:

- To assess university students' attitudes toward green computing and identify the factors influencing their intention to adopt energy-efficient practices.
- To determine the impact of gender on students' attitudes and behaviors regarding green computing in university settings.

Addressing the lack of awareness of green education among East-West University students requires a structured and cost-effective approach. This research plan ensures actionable insights and impact interventions by engaging with the university authorities and utilizing tailored questionnaires for data collection. The refinement of our method completely relies on the feedback of the students, the cooperation of the higher authority, and the willingness to change. As this initiative continues to evolve and improve, it creates the opportunity to not only foster a culture of sustainability and renewable habits but also to serve as a replicable model for other organizations. Furthermore, this work contributes to the broader goal of empowering future generations with knowledge and encouragement to address all types of global issues effectively.