CS301-Software Engineering

Class Practice Sessions – 2&3

Theme : Evolution of digitalisation in the energy sector

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Objective: To develop Digital-based future energies

1. List various requirements(scope) for the above program initiative that can be used for developing a suitable technology oriented digital solution.

Solution:

Based on the information provided in our discussion about digitalisation in the energy sector and the objective of developing digital-based future energies, here are some potential requirements or scope for a technology-oriented digital solution:

1. Compatibility: The solution must be compatible with existing energy infrastructure and technologies.
2. Interconnectivity: The solution should provide interconnectivity between renewable energy systems, energy storage, and distribution networks.
3. Real-time monitoring: The solution should be capable of real-time monitoring of energy generation, usage, and distribution to enable timely decision-making and predictive maintenance.
4. Data management: The solution should offer effective data management capabilities, including data collection, storage, analysis, and reporting.
5. Cybersecurity: The solution must be secure, and have robust cybersecurity features that protect data and systems from cyber attacks.
6. Scalability: The solution should be scalable to accommodate future growth and changing energy demands.

7. User-friendly: The solution should be user-friendly and accessible to all stakeholders, including energy companies, customers, and other relevant parties.
8. Integration: The solution should integrate well with other energy management systems and be compatible with other technologies.
9. Sustainability: The solution should be sustainable, and ensure the efficient use of energy, resources, and assets.
10. Regulatory compliance: The solution should comply with relevant energy regulations, standards, and policies.

These are some potential requirements that can be considered while developing a suitable technology-oriented digital solution for the objective of developing digital-based future energies.
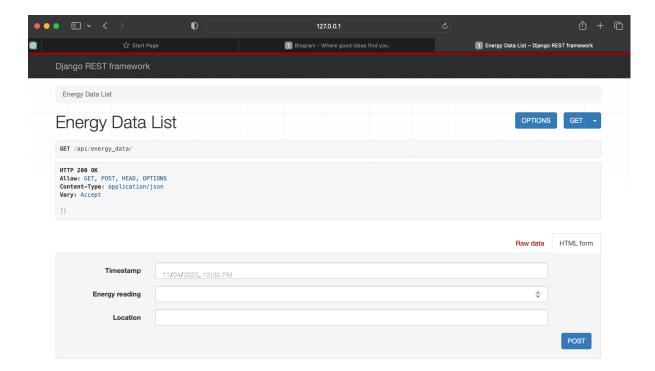
2. Identify various technologies, tools and systems available in the market to support these needs.

Solution:

There are various technologies, tools, and systems available in the market that can support the needs of digitalisation in the energy sector. Here are some examples:

1. IoT (Internet of Things): IoT devices can be used for real-time monitoring of energy generation, consumption, and distribution.
2. Blockchain: Blockchain technology can be used to create secure and transparent systems for energy trading and billing.
3. AI (Artificial Intelligence): AI can be used for predictive maintenance, optimisation of energy usage, and forecasting energy demands.
4. Cloud computing: Cloud computing can be used to manage and store large amounts of energy data, making it accessible from anywhere.
5. GIS (Geographic Information System): GIS can be used to create maps and visualisations of energy systems, making it easier to manage and monitor them.
6. Big Data Analytics: Big data analytics can be used to analyse large volumes of energy data, providing insights for energy management and decision-making.

7. SCADA (Supervisory Control and Data Acquisition): SCADA systems can be used to remotely monitor and control energy systems.
8. Digital twins: Digital twins can be used for modelling and simulation of energy systems, helping with optimisation and decision-making.
9. Cybersecurity tools: Cybersecurity tools can be used to protect energy systems from cyber threats and ensure data privacy.
10. Energy storage systems: Energy storage systems such as batteries and fuel cells can be used to store renewable energy, increasing the efficiency and reliability of energy systems.

These are just a few examples of the various technologies, tools, and systems available in the market that can support the needs of digitalisation in the energy sector.

3. Generate one API and suitable data analysis Code base to access the energy related data set and perform data analysis.

   ● Added the code file *

Django REST framework

Energy Data List

Energy Data List

OPTIONS   GET ▾

GET /api/energy_data/

```
HTTP 200 OK
Allow: GET, POST, HEAD, OPTIONS
Content-Type: application/json
Vary: Accept

[]
```

Raw data   HTML form

Timestamp	11/04/2023, 12:30 PM
Energy reading	
Location	

POST

Energy Data List

GET /api/energy_data/

```
HTTP 200 OK
Allow: GET, POST, HEAD, OPTIONS
Content-Type: application/json
Vary: Accept

[
    {
        "id": 1,
        "timestamp": "2023-04-10T03:51:00Z",
        "energy_reading": 6.3562,
        "location": "Karnataka"
    },
    {
        "id": 2,
        "timestamp": "2023-04-10T07:09:00Z",
        "energy_reading": 5.3828,
        "location": "Karnataka"
    },
    {
        "id": 3,
        "timestamp": "2023-04-11T07:09:00Z",
        "energy_reading": 8.6437,
        "location": "UttarPradesh"
    }
]
```