Scientific applications

1. **Healthcare: ECG analysis in the cloud**
   ● cloud technologies to support doctors in providing more effective diagnostic processes.
   ● Internet connectivity and its accessibility from any device at any time has made cloud technologies an attractive option for developing healthmonitoring systems.

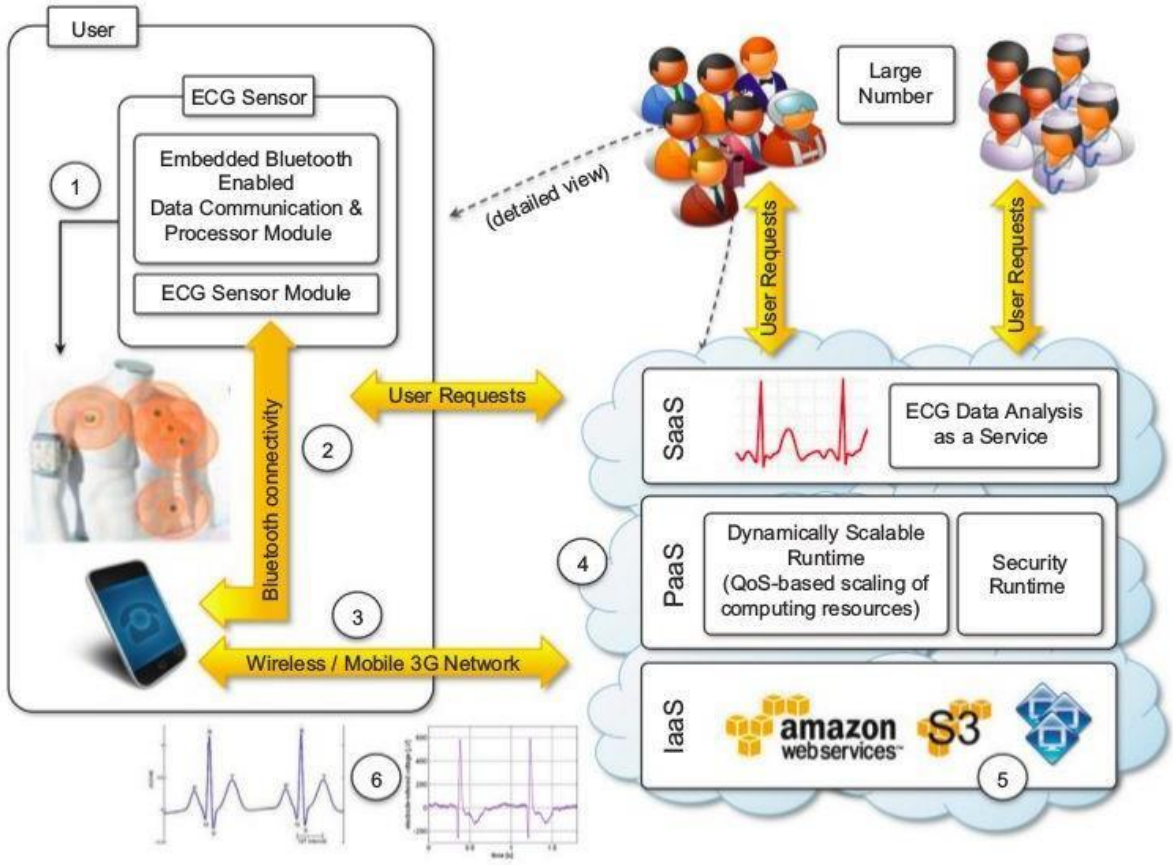

FIGURE 10.1
An online health monitoring system hosted in the cloud.

2. Biology: protein structure prediction
   ● Require high computing capabilities and often operate on large data-sets that cause extensive I/O operations.
   ● extensive use of supercomputing and cluster computing infrastructures.
   ● Protein structure prediction is a computationally intensive task.
   ● The geometric structure of a protein cannot be directly inferred from the sequence of genes that compose its structure, but it is the result of complex computations aimed at identifying the structure.
   ● This task requires investigation of space with massive number of states, creating large number of computations for each of these states.
3. **Biology: gene expression data analysis for cancerdiagnosis**
   ● measurement of the expression levels of thousands of genes at once.
   ● used to understand the biological processes that are triggered by medical treatment at a cellular level.

● Gene expression profiling is utilized to provide a more accurate classification of tumors

4. **Geoscience: satellite image processing**
   ● collect, produce, and analyze massive amounts of geospatial and nonspatial data.
   ● the **geographic information system (GIS)** is a major element of geoscience applications. GIS applications capture, store, manipulate, analyze, manage, and present all types of geographically referenced data.

Business & consumer applications

1 CRM and ERP

1 Salesforce.com
2 Microsoft dynamics CRM
3 NetSuite

2 Productivity

1 Dropbox and iCloud
2 Google docs
3 Cloud desktops: EyeOS and XIOS/3

3 Social networking

1 Facebook

1. **CRM and ERP**

● Customer relationship management (CRM) and enterprise resource planning (ERP) applications are market segments that are flourishing in the cloud.
● access to business and customer data from everywhere and from any device.
● ERP systems integrate several aspects of enterprise: finance and accounting, human resources, manufacturing, supply chain management, project management, and CRM.
● ERP solutions are less popular than CRM solutions at this time

a. **Salesforce.com**
   - most popular and developed CRM solution available today.
   - Salesforce.com is based on Force.com cloud development platform.

b. **Microsoft dynamics CRM**
   - completely hosted in Microsoft's datacenters across the world and offers to customers a 99.9% SLA.
   - Each CRM instance is deployed on a separate database, and the application provides users with facilities for marketing, sales, and advanced customer relationship management.

c. **NetSuite**
   - Three major products: NetSuite Global ERP, NetSuite Global CRM1 , and NetSuite Global Ecommerce.
   - All-in-one solution: NetSuite One World, integrates all three products together.
   - Two large datacenters on the East and West coasts of the United States, connected by redundant links.
   - The NetSuite Business Operating System (NS-BOS) is complete stack of technologies for building SaaS.

2. **Productivity**

   a. **Google docs**
      - Google Docs allows users to create and edit text documents, spreadsheets, presentations, forms, and drawings.
      - It aims to replace desktop products such as Microsoft Office and OpenOffice and provide similar interface and functionality as a cloud service.

   b. **Cloud desktops: EyeOS and XIOS/3**
      - EyeOS 1 is one of the most popular Web desktop solutions.
      - Replicates the functionalities of a classic desktop environment and comes with pre-installed applications for the most common file and document management tasks.

      Xcerion XML Internet OS/3 (XIOS/3)
      - Another example of a Web desktop environment.
      - Strong leverage of XML, used to implement many of the tasks of the OS: rendering user interfaces, defining application business logics, structuring file system organization, and even application development.

   c. **Icloud (see yourself)**

3. **Social networking**
   a. **Facebook**
      ● 800 million users
      ● Two data centers built and optimized to reduce costs and impact on environment.
      ● Technologies constitute a powerful platform for developing cloud applications.
      ● The reference stack serving Facebook is based on LAMP (Linux, Apache,MySQL, and PHP).
      ● The social graph identifies collection of interlinked information that is of relevance for a given user.
      ● Most of the user data are served by querying a distributed cluster of MySQL.
      ● These data are then cached for faster retrieval.
      ● Thrift - collection of abstractions that allow cross-language development.

Challenges of cloud computing

Despite all the development and potential of cloud computing services, there are multiple challenges of cloud computing services that businesses face. Here we have compiled a list of challenges of cloud computing that need to be taken care of, to leverage the maximum capability of the cloud. Let us get started:

- Security
- Password Security
- Cost Management
- Lack of expertise
- Internet Connectivity
- Control or Governance
- Compliance
- Performance
- Migration
- Interoperability and Portability
- Reliability and High Availability