

This paper describes what's new in mobile computing and how organizations can leverage mobile computing in the implementation of their business processes. We explore the advances in mobile computing, the impacts on IT architecture, and challenges organizations need to consider when creating an optimized mobile solution.

The Next Generation of Mobile Computing

To properly discuss mobile computing, it is important to first establish a comprehensive definition. Mobile computing can be defined as "the use of hand-held computer devices capable of wireless broadband network access utilizing battery power and capable of operating in a disconnected fashion when network connectivity is not available."

While the definition could be broadened to include other device types such as mobile phones, PDAs and tablet technology, and other usage scenarios, we find the above definition to encapsulate the more historically commercial areas of mobile computing.

How Mature is Mobile Computing?

Mobile computing is not a new field. Portable computer terminals have been used in various business domains for over two decades in both connected and disconnected fashion.

In the connected world, remote access terminals have been used in applications such as remote police car terminals, taxi dispatching terminals and package delivery. For example, UPS introduced its delivery information acquisition device in the early '90s. These terminals have provided communication facilities and access to domain-specific databases from remote locations through the use of wireless bandwidth links.

In the disconnected world, remote terminals have been used in inventory and stocking applications to gather data. The remotely gathered data is then transferred to central databases through fixed communication links. Inventory control tracking systems are typical examples of this usage paradigm.

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What’s New in Mobile Computing?

While the concept of mobile computing is well established, industry has recently evolved to the point where the involved technologies have become sufficiently economical and powerful that mobile computing is now ubiquitous. This is evidenced by the consumerization of mobile computing through form factors such as tablets, smartphones and netbooks.

A number of synergistic technology improvements have driven the rapid advances in mobile computing:

- Central Processing Unit (CPU) advances are providing powerful computational abilities with lower power consumption.
- Memory technology is making it practical to build devices with large memory capacities in reasonable power consumption characteristics.
- Screen technology advances are supplying higher resolution and vivid colour screens.
- Touch-screen interface technology is removing the need for separate keyboards.
- Battery technology is supplying useful power reserves while requiring smaller amounts of space.
- Wireless network bandwidth is becoming ubiquitous, providing greater data transfer speeds at reasonable costs.

While advances in hardware have provided more capable devices at lower costs, the trends towards web-based computing have provided standardized tools and techniques for programming the new generation of mobile devices:

- Open communication protocols such as TCP/IP and HTTP.
- Decoupling the user device from server resources in a standardized fashion.
- Methods for presenting multimedia data types (audio and video) in addition to the more traditional forms-based data types.

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How Can You Leverage Mobile Computing?

The extent to which you can leverage the capabilities of mobile computing will depend on your business processes. The defining characteristic of mobile computing is portable access to your data and applications. The usefulness of this ability will depend on how you complete the various steps in your business processes.

While mobile computing can present advantages in the implementation of your business processes, there are associated challenges:

1 Application Design

Application design in the mobile space can be more challenging than design for traditional form factors.

Mobile design presents additional challenges in user interface design, efficient use of hardware resources (battery life, network bandwidth), ability to operate in disconnected scenarios when the network is not available, and integration with your existing applications and enterprise architecture.

2 Security

Data must be protected while in transit between the server and mobile devices. Server resources must be protected from unauthorized access, and data must be protected to minimize business risk in the event that the mobile device is compromised.

3 Consumerization

Keen and aggressive uptake of mobile computing by public consumers has led to a proliferation of devices. Managing the number of device types that the user community will wish to use will pose an ongoing challenge. From an application development perspective this presents challenges as devices will vary with respect to display size and capabilities, types of available hardware resources (accelerometers, GPS capabilities, on-board cameras, etc.) and different user input modalities (touch screen, keypad, etc.).

These challenges can be addressed through appropriate software architecture and design, although the techniques required to do so are new as they are not required in the traditional desktop environment.

- Disconnected operation can be addressed through caching of data on the mobile device to provide data required for local operation, and the use of message queues to defer communication when network services are not available.

About Quadrus

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- User interface challenges can be addressed by designing the user interface within the limitations of the mobile device. This can potentially involve the use of the device's SDK to build a native application, or leveraging the capabilities of HTML5 to build a modern browser-based application.
- Security challenges can be addressed through the use of secure communication protocols, password protected devices and applications, encryption of local data stores, and remote wiping capabilities for lost or compromised devices.

While mobile computing can extend the flexibility and utility of your business processes, the use of mobile devices present additional challenges that should be considered within the framework of your overall IT architecture.