
Class-Computer Engineering div-1

Sem-4

Academic Year- 2024-2025

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Title-Presentation on Symbian OS

Subject - Operating System

Activity type -Presentation

Date-11.02.2025

# Description of the topic

Symbian OS was one of the pioneering mobile operating systems widely used in smartphones during the late 1990s and early 2000s. Developed by Symbian Ltd., it was designed as a robust, multitasking platform optimized for resource-constrained devices. Known for its modular architecture, Symbian OS supported a variety of programming languages, including C++, Java, and Python, allowing developers to create versatile applications for mobile devices. Its widespread adoption by manufacturers like Nokia, Sony Ericsson, and Samsung played a significant role in shaping the early smartphone industry.

However, with the rise of modern mobile operating systems such as Android and iOS, Symbian OS gradually lost prominence and was eventually discontinued. Despite this, its legacy as a trailblazer in mobile technology remains notable in the history of operating systems.

Symbian OS was a trailblazer in the evolution of mobile operating systems, known for its efficiency in managing limited hardware resources while providing a rich user experience. Initially created in 1998 through a collaboration between major tech companies like Nokia, Ericsson, and Motorola, it became the backbone of many early smartphones.

Its architecture featured a microkernel, which improved security and reliability, and its adaptability allowed it to support various hardware configurations and features, such as touchscreen interfaces and mobile internet connectivity. Symbian OS was particularly popular for its focus on energy efficiency, which made it well-suited for battery-operated devices.

Over time, Symbian introduced features like app stores, multimedia support, and advanced communication tools, which were revolutionary for its era. Despite its innovative edge, the system struggled to keep up with rapidly advancing competitors, eventually being overshadowed by the user-friendly ecosystems of iOS and Android.

Nevertheless, Symbian's contributions laid the groundwork for many aspects of modern smartphone technology.

# Ppt Handouts


**Subject** - Operating system

**Topic** - Presentation on Symbian OS

# Group Members

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- Charu Dwivedi(16)

**Submitted To-** Prof. Mrunal Bewoor Ma'am

# Origin of Symbian OS

1. Psion EPOC (1980s - Early 1990s): Symbian's story begins with Psion, a British company. They developed the EPOC operating system in the early 1990s for their PDAs (personal digital assistants)
2. Formation of Symbian (1998)*: Psion, along with Nokia, Ericsson, and Motorola, established Symbian Ltd. to create a mobile operating system. The goal was to develop a platform for smartphones. The first version of Symbian OS was based on Psion's EPOC system.
3. First Symbian Phones (2000s): As Nokia became a key partner, Symbian OS was used in a wide range of mobile phones, marking the platform's rise in popularity throughout the early 2000s.

# Evolution of Symbian Operating System

- 1998 – Formation*: Symbian OS was founded as a joint venture between Nokia, Ericsson, Motorola, and Psion.
- 1999 – Launch*: The first version of Symbian OS was introduced, based on Psion's EPOC operating system.
- 2000s – Growth*: Symbian became the dominant smartphone OS, with Nokia being its major supporter. It ran on devices like the Nokia 6600 and N95.
- 2008 – Symbian Foundation*: The Symbian Foundation was created to make the OS open-source, encouraging wider development.
- 2009 – Decline Begins*: Nokia started facing stiff competition from Apple's iPhone and Android. Symbian struggled with user experience and developer support.
- 2011 – Nokia Acquisition*: Nokia announced its partnership with Microsoft, shifting focus to Windows Phone. Symbian was gradually phased out.
- 2012 – End of Major Updates*: Nokia stopped major updates for Symbian, and the platform's support significantly dwindled.
- 2014 – End of Life*: Symbian was officially discontinued by Nokia, marking the end of its era.

# Features of Symbian OS

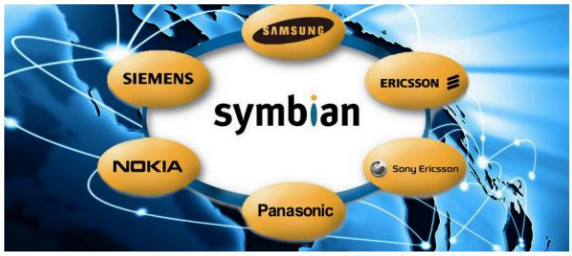
- 1.Multitasking: Symbian OS supported true multitasking, allowing users to run multiple applications simultaneously without significant performance lag.
- Real-time Operating System: It had real-time capabilities, which ensured fast and predictable response times, critical for mobile phone applications.
- Customizable User Interface: The OS allowed manufacturers to customize the user interface (UI) to match their brand identity, like Nokia's Series 40 and Series 60 interfaces.
- Security: Symbian had a strong security framework with app permissions, encryption, and digital signatures to protect users and their data.

# Advantages

1. Efficient: Symbian OS was designed to use less battery and memory, making it great for mobile phones.
2. Stable: It was known for being reliable and not crashing often.
3. Good Connectivity: It had strong features for connecting to networks and other devices.
4. Open to Developers: Many developers could create apps for it, giving users more options.
5. Popular: It was widely used, especially by Nokia, making it familiar to many users.

# Disadavantages

1. Complex User Interface: The user interface was often considered less intuitive and more complicated compared to newer operating systems like iOS and Android.
2. Performance Issues: As hardware capabilities improved, Symbian OS struggled to fully utilize the new hardware, leading to performance issues on more advanced devices.
3. Slow Development: Updates and new features were slow to roll out, which made it difficult for Symbian OS to keep up with rapidly evolving technology and user expectations.
4. Fragmentation: Different versions of Symbian OS were used across various devices, leading to fragmentation and inconsistency in user experience




# Services provided by Symbian

1. Multitasking: Symbian OS allowed users to run multiple applications simultaneously, enhancing productivity and user experience.
2. Connectivity: It provided robust support for various connectivity options, including Bluetooth, Wi-Fi, and mobile data, making it easy to stay connected.
3. Security: Symbian OS had built-in security features to protect user data and ensure safe usage of the device.
4. Application Support: It supported a wide range of applications, allowing users to customize their devices with various tools and entertainment options.
5. User Interface: Symbian OS offered a customizable user interface, enabling users to personalize their devices according to their preferences.
6. Power Management: It was designed to be efficient in power usage, helping to extend battery life on mobile devices.
7. Multimedia: Symbian OS provided strong support for multimedia features, including audio and video playback, as well as camera functionality.

# Architecture of Symbian OS

**Kernel Services & Hardware Abstraction**

- Manages low-level hardware interactions.
- Provides essential kernel functions like memory management, process scheduling, and device drivers.

**Base Services**

- Acts as the foundation for higher-level operations.
- Includes file system management, communication protocols, and security features.

**Middleware Services**

- Generic OS Services: Core system functionalities like resource allocation and power management.
- Common Services: Provides system-wide services such as messaging and data management.
- Multimedia & Graphics: Handles audio, video, and graphical processing for a smooth user experience.
- Connectivity Services: Supports network communication, including Bluetooth, Wi-Fi, and telephony.

**Application Services**

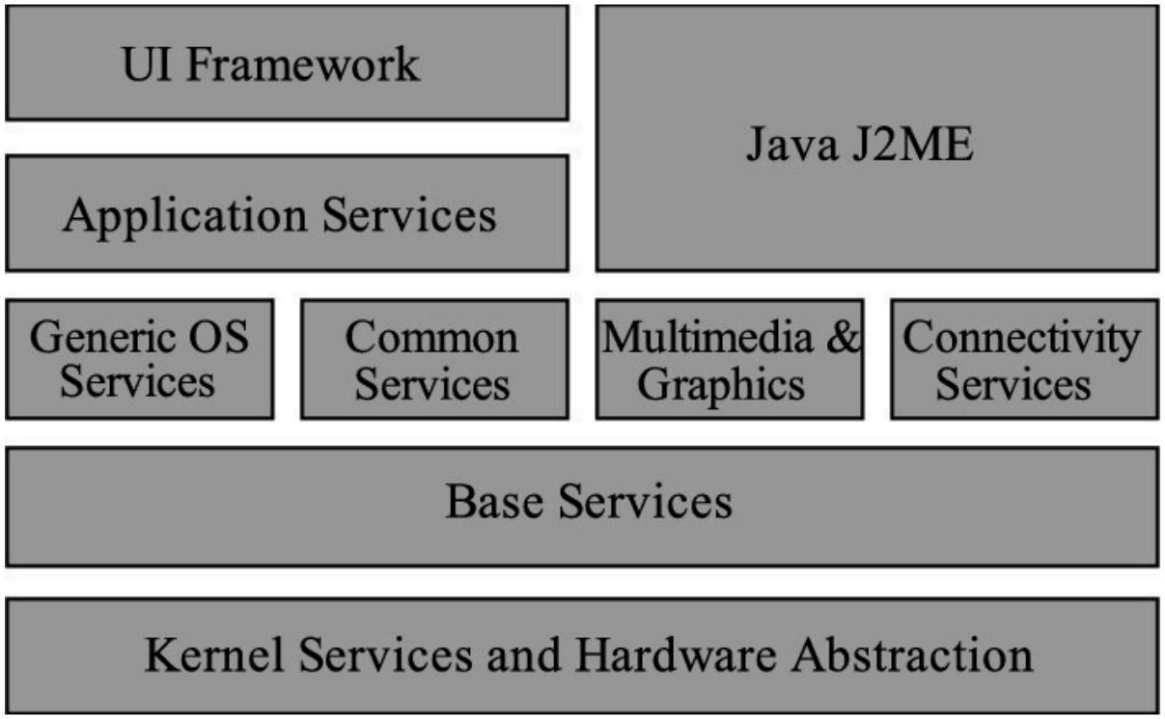
- Provides APIs and frameworks to support third-party applications.
- Includes features like task management, notifications, and data synchronization.

**User Interface (UI) Framework**

- Manages graphical user interface components for different Symbian UI platforms (e.g., S60, UIQ).
- Provides essential UI controls and themes for application developers.

**Java J2ME Layer**

- Supports Java applications for additional app development flexibility.
- Provides a runtime environment for Java-based mobile applications.


UI Framework
Java J2ME
Application Services
Generic OS Services
Common Services
Multimedia & Graphics
Connectivity Services
Base Services
Kernel Services and Hardware Abstraction

# Architecture Overview of Symbian, Android, and iOS

**Symbian OS Architecture:**

- Microkernel-based architecture (EKA2) ensures stability and efficiency.
- Layered design with Hardware Abstraction, OS Services, Middleware, and UI Frameworks.
- Applications require Symbian Signed certification for security.
- Optimized for low power consumption and real-time operations.
- Event-driven multitasking for resource management.

**Android OS Architecture:**

- Monolithic Linux-based kernel provides stability and hardware abstraction.
- Key layers include:
  - Linux Kernel (handles process management, memory, drivers).
  - Native Libraries (C/C++ libraries like OpenGL, SQLite).
  - Android Runtime (ART/Dalvik VM) (executes Java/Kotlin code).
  - Application Framework (provides APIs for UI, telephony, etc.).
  - User Applications (pre-installed and third-party apps).
- Uses sandboxing for security and process isolation.

**iOS Architecture:**

- Hybrid kernel (XNU - Unix & Mach) provides performance and security.
- Key layers include:
  - Core OS Layer (kernel, drivers, networking, file system).
  - Core Services Layer (database, location services, security APIs).
  - Media Layer (graphics, audio, video frameworks).
  - Cocoa Touch Layer (UI frameworks like UIKit, multitouch support).
- Implements strict sandboxing, app notarization, and biometric authentication.

| Feature | Symbian OS | Android OS | iOS OS |
|---|---|---|---|
| Kernel Type | Microkernel-based (EKA2) | Monolithic Linux-based kernel | Hybrid (XNU - Unix & Mach) |
| Layers | Hardware Abstraction, OS Services, Middleware, UI Frameworks | Linux Kernel, Native Libraries, Android Runtime (ART/Dalvik), Application Framework, Apps | Core OS, Core Services, Media, Cocoa Touch (UI) |
| Application Execution | Uses Application Launcher Server | Runs in ART/Dalvik Virtual Machine | Runs natively in a sandboxed environment |
| Security Model | Capability-based access control | Sandboxing, SELinux, App Permissions | Strict sandboxing, biometric authentication |
| Development Language | Symbian C++ | Java/Kotlin (Android Studio) | Swift/Objective-C (Xcode) |
| App Format | SIS/SISX | APK/AAB | IPA |
| Multitasking | Event-driven architecture | Supports background execution and process isolation | Efficient multitasking with strict resource management |
| Market Status | Discontinued, no longer in use | Dominates mobile market | Premium market share with Apple devices |

# Symbian OS vs. Other OS

| Feature | Symbian OS | Other OS (Android, iOS, etc.) |
|---|---|---|
| Architecture & Design | Microkernel-based, optimized for low-power devices, strict memory management | Monolithic/hybrid kernels, requires higher processing power |
| User Interface (UI) & Applications | Early UI (Series 40, 60, UIQ), limited modern UI support, apps in C++ with Symbian SDK | Advanced UI (Material Design, Human Interface), supports multiple languages like Java/Kotlin, Swift |
| Security & Performance | Strong security (capability-based access), lower processing power but optimized | Advanced security (sandboxing, biometrics), higher performance due to powerful hardware |
| Market Reach & Decline | Once dominant but declined due to slow innovation and lack of developer support | Android & iOS dominate with regular updates and vast app ecosystems |
| Conclusion | Efficient but lacked scalability and modern app support | Evolved with advanced UI, security, and extensive developer support |

# How Applications Run in Symbian OS

**Execution Process in Symbian OS**

1. **Application Development:**
   - Written in Symbian C++.
   - Uses Carbide.c++ IDE for development.
2. **Application Signing:**
   - Requires Symbian Signed certification for security and access permissions.
3. **Installation & Execution:**
   - Apps are installed as SIS/SISX files.
   - Uses the Application Launcher Server to load and run applications.
4. **Memory & Process Management:**
   - Optimized for low-power devices.
   - Uses an event-driven architecture to handle multitasking efficiently.
5. **Security & Access Control**:
   - Capability-based access ensures only authorized apps can access system resources.

# How Applications Run in Other OS (Android, iOS, etc.)

**Execution Process in Modern OS**

1. Application Development:
   - Android: Uses Java/Kotlin with Android Studio.
   - iOS: Uses Swift/Objective-C with Xcode.
2. Application Verification & Deployment:
   - Android: Verified through Google Play Protect before publishing on Play Store.
   - iOS: Requires App Store approval and notarization.
3. Installation & Execution:
   - Android: Installed as APK/AAB files, executed in Dalvik/ART virtual machine.
   - iOS: Installed as IPA files, executed in a sandboxed environment.
4. Memory & Process Management:
   - Supports multitasking, background execution, and process isolation.
   - Uses advanced runtime environments for high performance.
5. Security & Access Control:
   - Android: Uses sandboxing, app permissions, and SELinux for security.
   - iOS: Implements strict sandboxing, Face ID/Touch ID, and App Transport Security.

# Companies That Used Symbian OS

Several mobile manufacturers adopted Symbian OS before it was phased out. Notable companies include:

1. Nokia – The primary and largest user of Symbian, powering devices like the N95, N97, and E-series.
2. Sony Ericsson – Developed Symbian-based smartphones such as the P800, P900, and Satio.
3. Samsung – Released Symbian devices like the Samsung i8910 Omnia HD.
4. Motorola – Used Symbian UIQ in models like the Motorola A920 and A1000.
5. Fujitsu – Manufactured Symbian-powered flip phones, mainly for the Japanese market.
6. Sharp – Developed Symbian-based handsets, especially for NTT DoCoMo.
7. Panasonic – Released Symbian devices tailored for the Japanese telecom sector.
8. Siemens – Briefly experimented with Symbian OS, launching models like the Siemens SX1.

These companies played a significant role in the adoption of Symbian before its decline with the rise of iOS and Android.

## Symbian OS vs. Windows

Development Environment:

1. Symbian OS: Used Symbian C++ for app development, which had a steep learning curve.
2. Windows Mobile: Supported development with familiar Microsoft tools like Visual Studio.

Support and Updates:

1. Symbian OS: Updates became infrequent as the platform declined.
2. Windows Mobile: Received regular updates but struggled to maintain market share.

## Symbian OS vs.

Openness:

1. Symbian OS: More closed than Android, with less flexibility for customization.
2. Android: Open-source, highly customizable, and widely adopted by various manufacturers.

User Experience:

1. Symbian OS: Reliable and functional, but not as intuitive or visually appealing.
2. Android: Offers a diverse user experience with varying levels of customization, depending on the manufacturer and version.

# Applications of Symbian OS

Symbian OS was widely used in mobile devices and supported various applications, including:

1. Telephony & Messaging:
   - Built-in call management, SMS, MMS, and email support.
2. Web Browsing & Internet:
   - Integrated web browsers with support for WAP, HTML, and JavaScript.
3. Multimedia & Entertainment:
   - Music and video playback, FM radio, and support for third-party media apps.
4. Gaming:
   - Supported Java-based and native Symbian C++ games.
5. Navigation & GPS Services:
   - Integrated GPS with mapping and navigation applications.
6. Productivity Tools:
   - Document viewers, calendars, notes, and office suite compatibility.
7. Third-Party Applications:
   - A wide range of apps available through Nokia Ovi Store and other sources.

# CONCLUSION

For many, Symbian OS holds a special place in their mobile phone history. It ushered in an era of mobile communication and entertainment, empowering users with powerful devices and a growing app ecosystem. While its reign may have ended, Symbian OS will always be remembered as a pioneer in the mobile revolution.



**Here's the extended outcome rewritten to include "our" perspective in past tense:**

**Enhanced Technical Insight**: Writing our report deepened our understanding of early mobile operating systems, providing us with foundational knowledge to explore more advanced technologies.

**Critical Analysis Skills**: We gained the ability to compare legacy systems like Symbian OS with modern platforms, which helped us understand the evolution of mobile technology.

**Academic Achievement**: Our teacher recognized the depth of our research and effort, leading to positive feedback or improved grades.

**Professional Relevance**: Our report served as a starting point to demonstrate our knowledge and interest in operating systems or mobile software, making it relevant for our career aspirations.

**Historical Perspective**: We understood how Symbian OS influenced the development of subsequent mobile systems, giving us a broader appreciation of technological progress.

**Knowledge Sharing**: Our well-organized report helped peers or colleagues learn about the significance of Symbian OS in the tech world.