

Intel 253668-022US

# Intel 64 and IA-32 Architectures Software Developer's Manual

## VOLUME 3A: SYSTEM PROGRAMMING GUIDE, PART 1

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### 1. Overview

This document is Revision 67 of the Intel 64 and IA-32 Architectures Software Developer's Manual, Volume 3A. It serves as Part 1 of the System Programming Guide, detailing aspects of the IA-32 architecture that are essential for supporting operating systems.

The complete five-volume Intel 64 and IA-32 Architectures Software Developer's Manual is the primary reference for the Intel Architecture as implemented in Intel 64 and IA-32 processors. This specific volume focuses on system-level programming concepts.

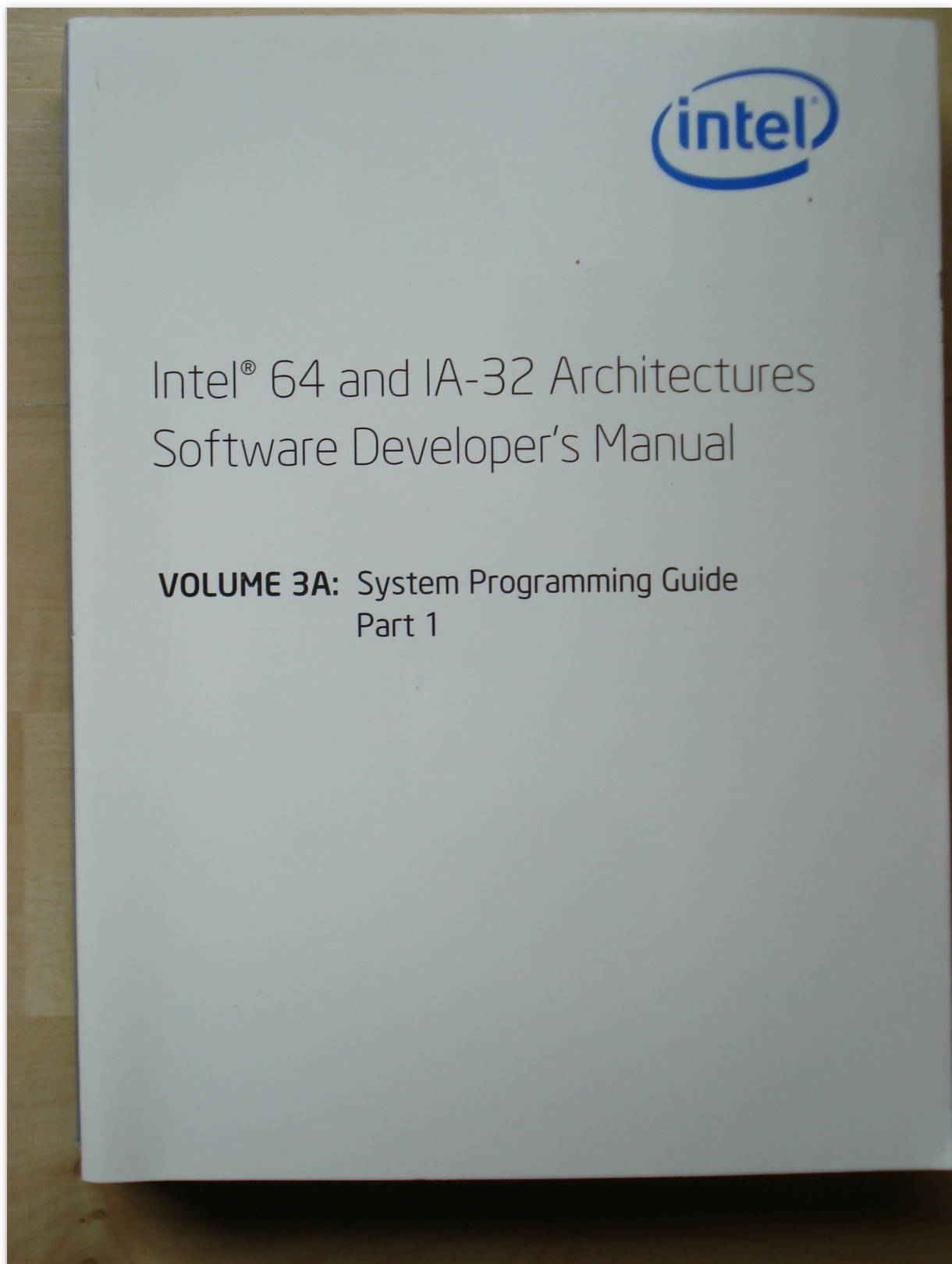


Figure 1: Cover of the Intel 64 and IA-32 Architectures Software Developer's Manual Volume 3A.

## 2. Evolution of Intel Architectures

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This manual provides comprehensive information for software developers working with Intel architectures. The following list outlines key Intel processors and their introduction years, providing historical context for the architectural developments discussed in this series:

- Intel 8086/8088: 1978
- Intel® 286: 1982

- Intel386™ CPU: 1985
- Intel486™ CPU: 1989
- Pentium® Processor: 1993
- Pentium® Pro Processor: 1995
- Pentium® Processor with MMX™ Technology: 1997
- Pentium® II Processor: 1997
- Pentium® III Processor: 1999
- Pentium 4 Processor: 2000
- Intel® Xeon® Processor: 2001
- Intel® Pentium® M Processor: 2003
- 64-bit Intel® Xeon® Processor: 2004
- Intel® Pentium Processor Extreme Edition: 2005
- Dual-Core Intel® Xeon® Processor: 2006
- Intel® Core™2 Duo Processor: 2006
- Quad-Core Intel® Xeon® Processor: 2006

### 3. Using This Manual

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This manual, Volume 3A, is part of a comprehensive five-volume set designed for software developers. To effectively utilize this guide, it is recommended to understand its place within the complete series:

- **Volume 1: Basic Architecture** describes the fundamental IA-32 architecture and programming environment relevant for application programmers developing software for existing operating systems and executives.
- **Volumes 2A and 2B: Instruction Set Reference [A-M] and [N-Z]** provide a complete description, including opcodes, for each instruction within the architecture.
- **Volumes 3A and 3B: System Programming Guide** describe the specific parts of the IA-32 architecture that are designed to support operating systems. This current document is Volume 3A, Part 1 of this guide.

Familiarity with general computer architecture and programming concepts is assumed. This manual is intended for developers who need to understand the low-level details of Intel 64 and IA-32 architectures for system-level programming tasks.

### 4. Prerequisites for Using This Manual

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This manual is a technical reference document. No physical setup is required for the manual itself. However, to apply the information contained within, users should have:

- A working knowledge of assembly language programming.
- An understanding of operating system principles.
- Access to a development environment suitable for system-level programming on Intel 64 or IA-32 architectures.
- The complete set of Intel 64 and IA-32 Architectures Software Developer's Manuals for cross-referencing.

### 5. Interpreting the Content

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The information in this manual is presented in a technical and detailed format. Key elements to note when reading include:

- **Terminology:** Specific terms related to Intel architecture are used consistently. Refer to Volume 1 for basic definitions if needed.
- **Code Examples:** Where applicable, code examples are provided to illustrate concepts. These examples are for illustrative purposes and may require adaptation for specific implementations.
- **Cross-References:** The manual frequently refers to other volumes or sections within the series. It is crucial to consult these references for a complete understanding.

## 6. Maintenance

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As a software developer's manual, this document does not require physical maintenance. For digital versions, ensure regular backups. For printed versions, store in a dry, cool place to preserve its condition.

## 7. Troubleshooting Information

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This manual provides technical specifications and programming guidance. It does not include troubleshooting steps for software or hardware issues. For troubleshooting specific development problems or system errors, consult relevant Intel developer forums, support documentation, or community resources.

## 8. Specifications

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<b>Title</b>	Intel 64 and IA-32 Architectures Software Developer's Manual Volume 3A; System Programming Guide Part 1
<b>Publisher</b>	Intel
<b>Revision</b>	67
<b>Order Number</b>	253668-022US
<b>ASIN</b>	B007JCYSH8
<b>Item Weight</b>	1.01 pounds
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## 9. Warranty Information

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This document is a technical publication and does not come with a product warranty in the traditional sense. Intel Corporation strives for accuracy in its technical documentation; however, specifications and information are subject to change without notice. Intel assumes no responsibility for errors or omissions. For the most current information, always refer to the latest official Intel documentation.

## 10. Support and Additional Resources

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For further assistance, updated documentation, or to engage with the developer community, please refer to the official Intel developer resources:

- **Intel Developer Zone:** <https://software.intel.com/>
- **Intel Documentation Library:** Search for the latest revisions of the Intel 64 and IA-32 Architectures Software Developer's Manuals.
- **Community Forums:** Engage with other developers and Intel experts for specific programming questions.

Always consult the official Intel website for the most up-to-date information and support channels.