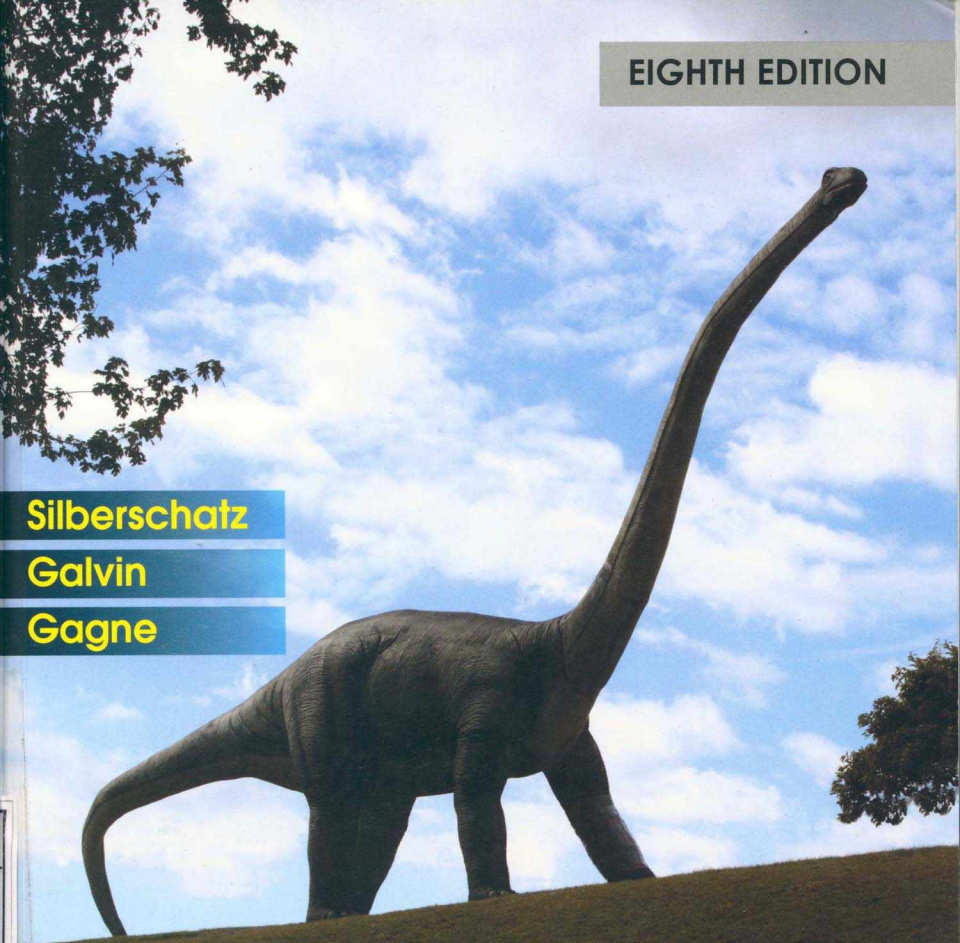
EIGHTH EDITION

Silberschatz
Galvin
Gagne



OPERATING SYSTEM CONCEPTS with JAVA

Thu Vien DHKTCN-TN
KDO.13008347

International Student Version

Operating System Concepts with Java

Eighth Edition

International Student Version

ABRAHAM SILBERSCHATZ
Yale University

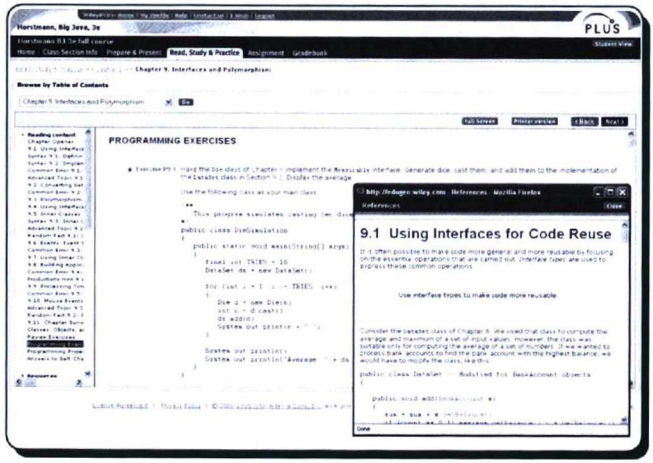
PETER BAER GALVIN
Corporate Technologies, Inc.

GREG GAGNE
Westminster College

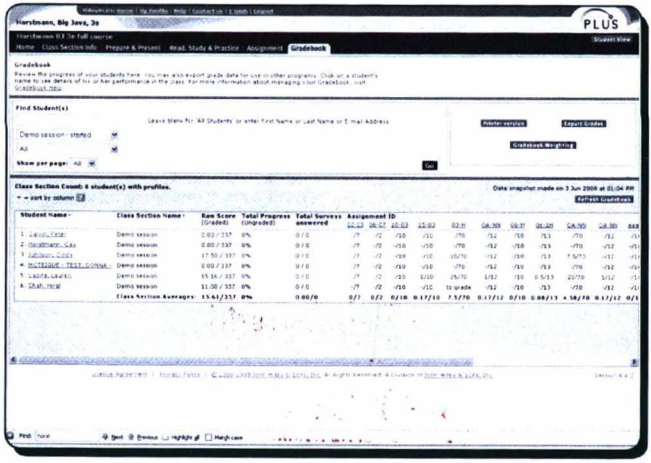
JOHN WILEY & SONS, INC

WileyPLUS combines robust course management tools with the complete text and all of the interactive teaching & learning resources you and students need in one easy-to-use system.

"Overall the WileyPLUS package made the material more interesting than if it was just a book with no additional material other than what you need to know."
– Edin Alic, North Dakota State University



- *Students easily acc source code for exa problems, as well a study materials and exercises and readi you assign.*



- *All instructional mate including PowerPoint illustrations and visu tools, source code, exercises, solutions a gradebook organized one easy-to-use syst*

"WileyPLUS made it a lot easier to study. I got an A!"
– Student Jeremiah Ellis Mattson, North Dakota State University

WILEY PLU

Operating System Concepts with Java

Eighth Edition

International Student Version

ABRAHAM SILBERSCHATZ
Yale University

PETER BAER GALVIN
Corporate Technologies, Inc.

GREG GAGNE
Westminster College

JOHN WILEY & SONS. INC

Copyright © 2011 John Wiley & Sons (Asia) Pte Ltd

Cover image from © Ryan Brocklehurst/iStockphoto

All rights reserved. **This book is authorized for sale in Europe, Asia, Africa and the Middle East only and may not be exported outside of these territories.** Exportation from or importation of this book to another region without the Publisher's authorization is illegal and is a violation of the Publisher's rights. The Publisher may take legal action to enforce its rights. The Publisher may recover damages and costs, including but not limited to lost profits and attorney's fees, in the event legal action is required.

No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or b any means, electronic, mechanical, photocopying, recording, scanning, or otherwise, except as permitted under Section 107 or 108 of the 1976 United States Copyright Act, without either the prior written permission of the Publisher or authorization through payment of the appropriate per-copy fee to the Copyright Clearance Center, Inc., 222 Rosewood Drive, Danvers, MA 01923, website www.copyright.com. Requests to the Publisher for permission should be addressed to the Permissions Department, John Wiley & Sons, Inc., 111 River Street, Hoboken, NJ 07030, (201) 748-6011, fax (201) 748-6008, website http://www.wiley.com/go/permissions.

ISBN: 978-0-470-39879-1

Printed in Asia

10 9 8 7 6 5 4 3 2

To my Valerie

Avi Silberschatz

To my parents, Brendan and Ellen Galvin

Peter Baer Galvin

To Steve, Ray, and Bobbie

Greg Gagne

Copyright © 2011 John Wiley & Sons (Asia) Pte Ltd

Cover image from © Ryan Brocklehurst/iStockphoto

All rights reserved. **This book is authorized for sale in Europe, Asia, Africa and the Middle East only and may not be exported outside of these territories.** Exportation from or importation of this book to another region without the Publisher's authorization is illegal and is a violation of the Publisher's rights. The Publisher may take legal action to enforce its rights. The Publisher may recover damages and costs, including but not limited to lost profits and attorney's fees, in the event legal action is required.

No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or b any means, electronic, mechanical, photocopying, recording, scanning, or otherwise, except as permitted under Section 107 or 108 of the 1976 United States Copyright Act, without either the prior written permission of the Publisher or authorization through payment of the appropriate per-copy fee to the Copyright Clearance Center, Inc., 222 Rosewood Drive, Danvers, MA 01923, website www.copyright.com. Requests to the Publisher for permission should be addressed to the Permissions Department, John Wiley & Sons, Inc., 111 River Street, Hoboken, NJ 07030, (201) 748-6011, fax (201) 748-6008, website http://www.wiley.com/go/permissions.

ISBN: 978-0-470-39879-1

Printed in Asia

10 9 8 7 6 5 4 3 2

To my Valerie

Avi Silberschatz

To my parents, Brendan and Ellen Galvin

Peter Baer Galvin

To Steve, Ray, and Bobbie

Greg Gagne

Abraham Silberschatz is the Sidney J. Weinberg Professor & Chair of Computer Science at Yale University. Prior to joining Yale, he was the Vice President of the Information Sciences Research Center at Bell Laboratories. Prior to that, he held a chaired professorship in the Department of Computer Sciences at the University of Texas at Austin.

Professor Silberschatz is an ACM Fellow, an IEEE Fellow, and a member of the Connecticut Academy of Science and Engineering. He received the 2002 IEEE Taylor L. Booth Education Award, the 1998 ACM Karl V. Karlstrom Outstanding Educator Award, and the 1997 ACM SIGMOD Contribution Award. In recognition of his outstanding level of innovation and technical excellence, he was awarded the Bell Laboratories President's Award for three different projects—the QTM Project (1998), the DataBlitz Project (1999), and the NetInventory Project (2004).

Professor Silberschatz' writings have appeared in numerous ACM and IEEE publications and other professional conferences and journals. He is a coauthor of the textbook *Database System Concepts*. He has also written Op-Ed articles for the New York Times, the Boston Globe, and the Hartford Courant, among others.

Peter Baer Galvin is the CTO for Corporate Technologies (www.cptech.com), a computer facility reseller and integrator. Before that, Mr. Galvin was the systems manager for Brown University's Computer Science Department. He is also Sun columnist for *;login:* magazine. Mr. Galvin has written articles for *Byte* and other magazines, and has written columns for *SunWorld* and *SysAdmin* magazines. As a consultant and trainer, he has given talks and taught tutorials on security and system administration worldwide.

Greg Gagne is chair of the Computer Science department at Westminster College in Salt Lake City where he has been teaching since 1990. In addition to teaching operating systems, he also teaches computer networks, distributed systems, and software engineering. He also provides workshops to computer science educators and industry professionals.