

Real World Enterprise Reports Using VB6 and VB .NET

CARL GANZ, JR.



Real World Enterprise Reports Using VB6 and VB .NET
Copyright ©2003 by Carl Ganz, Jr.

All rights reserved. No part of this work may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying, recording, or by any information storage or retrieval system, without the prior written permission of the copyright owner and the publisher.

ISBN (pbk): 1-59059-064-3

Printed and bound in the United States of America 12345678910

Trademarked names may appear in this book. Rather than use a trademark symbol with every occurrence of a trademarked name, we use the names only in an editorial fashion and to the benefit of the trademark owner, with no intention of infringement of the trademark.

Editorial Directors: Dan Appleman, Gary Cornell, Simon Hayes, Martin Streicher, Karen Watterson, John Zukowski

Assistant Publisher: Grace Wong

Project Managers: Sofia Marchant, Laura Cheu, Nate McFadden

Copy Editor: Ami Knox

Production Editor: Laura Cheu

Compositor and Proofreader: Impressions Book and Journal Services, Inc.

Indexer: Lynn Armstrong

Artist and Cover Designer: Kurt Krames

Production Manager: Kari Brooks

Manufacturing Manager: Tom Debolski

Distributed to the book trade in the United States by Springer-Verlag New York, Inc., 175 Fifth Avenue, New York, NY, 10010 and outside the United States by Springer-Verlag GmbH & Co. KG, Tiergartenstr. 17, 69112 Heidelberg, Germany.

In the United States: phone 1-800-SPRINGER, email orders@springer-ny.com, or visit <http://www.springer-ny.com>.

Outside the United States: fax +49 6221 345229, email orders@springer.de, or visit <http://www.springer.de>.

For information on translations, please contact Apress directly at 2560 Ninth Street, Suite 219, Berkeley, CA 94710. Phone 510-549-5930, fax 510-549-5939, email info@apress.com, or visit <http://www.apress.com>.

The information in this book is distributed on an “as is” basis, without warranty. Although every precaution has been taken in the preparation of this work, neither the author(s) nor Apress shall have any liability to any person or entity with respect to any loss or damage caused or alleged to be caused directly or indirectly by the information contained in this work.

The source code for this book is available to readers at <http://www.apress.com> in the Downloads section.

To the memory of my three thousand fellow Americans murdered by terrorists on September 11, 2001, at the World Trade Center, the Pentagon, and in Shanksville, Pennsylvania.

God bless the United States of America.

World Trade Center

Gordon McCannel Aamoth Jr.
Edelmiro (Ed) Abad
Maria Rose Abad
Andrew Anthony Abate
Vincent Abate
Laurence Abel
William F. Abrahamson
Richard Anthony Aceto
Alicia Acevedo Carranza
Heinrich B. Ackermann
Paul Andrew Acquaviva
Donald L. Adams
Patrick Adams
Shannon Lewis Adams
Stephen Adams
Ignatius Adanga
Christy A. Addamo
Terence E. Adderley Jr.
Sophia B. Addo
Lee Adler
Daniel Thomas Afflitto
Emmanuel Afuakwah
Alok Agarwal
Mukul Agarwala
Joseph Agnello
David Agnes
Joao A.D. Aguiar Jr.
Lt. Brian G. Ahearn
Jeremiah J. Ahern
Joanne Ahladiotis
Shabbir Ahmed
Terrance Andre Aiken
Godwin Ajala
Gertrude M. Alagero
Andrew Alamenno
Margaret Ann (Peggy) Jezycki Alario
Gary Alberio
Jon L. Albert
Peter Craig Alderman
Jacquelyn Delaine Aldridge
Grace Alegre-Cua

David D. Alger
Boutros al-Hashim
Ernest Alikakos
Edward L. Allegretto
Eric Allen
Joseph Ryan Allen
Richard Dennis Allen
Richard Lanard Allen
Christopher Edward Allingham
Janet M. Alonso
Anthony Alvarado
Antonio Javier Alvarez
Juan Cisneros Alvarez
Telmo Alvear
Cesar A. Alviar
Tariq Amanullah
Angelo Amaranto
James Amato
Joseph Amatuccio
Christopher Charles Amoroso
Kazuhiro Anai
Calixto Anaya Jr.
Joseph Peter Anchundia
Kermit Charles Anderson
Yvette Anderson
John Andreacchio
Michael Rourke Andrews
Jean A. Andrucki
Siew-Nya Ang
Joseph Angelini Jr.
Joseph Angelini Sr.
Laura Angilletta
Doreen J. Angrisani
Lorraine D. Antigua
Peter Paul Apollo
Faustino Apostol Jr.
Frank Thomas Aquilino
Patrick Michael Aranyos
David Gregory Arce
Michael G. Arczynski
Louis Arena
Adam Arias
Michael J. Armstrong

Jack Charles Aron
Joshua Aron
Richard Avery Aronow
Japhet J. Aryee
Carl Asaro
Michael A. Asciak
Michael Edward Asher
Janice Ashley
Thomas J. Ashton
Manuel O. Asitimbay
Lt. Gregg Arthur Atlas
Debbie S. Atlas-Bellows
Gerald Atwood
James Audiffred
Frank Louis Aversano
Ezra Aviles
Samuel (Sandy) Ayala
Arlene T. Babakitis
Eustace (Rudy) Bacchus
John James Badagliacca
Jane Ellen Baeszler
Robert J. Baierwalter
Andrew J. Bailey
Brett T. Bailey
Tatyana Bakalinskaya
Michael S. Baksh
Julio Minto Balanca
Sharon Balkcom
Michael Andrew Bane
Kathy Bantis
Gerard Jean Baptiste
Walter Baran
Gerard A. Barbara
Paul V. Barbaro
James W. Barbella
Ivan Kyrillos Fairbanks Barbosa
Victor Daniel Barbosa
Colleen Ann Barkow
David Michael Barkway
Matthew Barnes
Sheila Patricia Barnes
Evan J. Baron
Renee Barrett-Arjune

Arthur T. Barry
 Diane G. Barry
 Maurice Vincent Barry
 Scott D. Bart
 Carlton W. Bartels
 Guy Barzvi
 Inna Basina
 Alysia Basmajian
 Kenneth William Basnicki
 Lt. Steven J. Bates
 Paul James Battaglia
 W. David Bauer
 Ivhan Luis Carpio Bautista
 Marlyn C. Bautista
 Jasper Baxter
 Michele (Du Berry) Beale
 Paul F. Beatini
 Jane S. Beatty
 Larry I. Beck
 Manette Marie Beckles
 Carl John Bedigian
 Michael Beekman
 Maria Behr
 Yelena Belilovsky
 Nina Patrice Bell
 Andrea Della Bella
 Stephen Elliot Belson
 Paul Michael Benedetti
 Denise Lenore Benedetto
 Domingo Benilda
 Bryan Craig Bennett
 Eric L. Bennett
 Oliver Duncan Bennett
 Margaret L. Benson
 Dominick J. Berardi
 James Patrick Berger
 Steven Howard Berger
 John P. Bergin
 Alvin Bergsohn
 Daniel D. Bergstein
 Michael J. Berkeley
 Donna Bernaerts-Kearns
 Dave Bernard
 William Bernstein
 David M. Berray
 David S. Berry
 Joseph J. Berry
 William Reed Bethke
 Timothy D. Betterly
 Edward F. Beyea
 Paul Michael Beyer
 Anil T. Bharvaney
 Bella Bhukhan
 Shimmy D. Biegeleisen
 Peter Alexander Bielfeld
 William Biggart
 Ralph Bijoux
 Brian Bilcher
 Carl Vincent Bini
 Gary Bird
 Joshua David Birnbaum
 George Bishop

Jeffrey D. Bittner
 Balewa Albert Blackman
 Christopher Joseph Blackwell
 Susan L. Blair
 Harry Blanding Jr.
 Janice L. Blaney
 Craig Michael Blass
 Rita Blau
 Richard M. Blood Jr.
 Michael A. Boccardi
 John Paul Bocchi
 Michael L. Bocchino
 Susan Mary Bochino
 Bruce Douglas (Chappy) Boehm
 Mary Katherine Boffa
 Nicholas A. Bogdan
 Darren C. Bohan
 Lawrence Francis Boisseau
 Vincent M. Boland Jr.
 Alan Bondarenko
 Andre Bonheur Jr.
 Colin Arthur Bonnett
 Frank Bonomo
 Yvonne L. Bonomo
 Sean Booker
 Juan Jose Borda Leyva
 Sherry Ann Bordeaux
 Krystine C. Bordenabe
 Martin Boryczewski
 Richard E. Bosco
 John Howard Boulton Jr.
 Francisco Bourdier
 Thomas H. Bowden Jr.
 Kimberly S. Bowers
 Veronique (Bonnie) Nicole Bowers
 Larry Bowman
 Shawn Edward Bowman Jr.
 Kevin L. Bowser
 Gary R. Box
 Gennady Boyarsky
 Pamela Boyce
 Michael Boyle
 Alfred Braca
 Sandra Conaty Brace
 Kevin H. Bracken
 David Brian Brady
 Alexander Braginsky
 Nicholas W. Brandemarti
 Michelle Renee Bratton
 Patrice Braut
 Lydia Estelle Bravo
 Ronald Michael Breitweiser
 Edward A. Brennan III
 Frank H. Brennan
 Michael Emmett Brennan
 Peter Brennan
 Thomas M. Brennan
 Capt. Daniel Brethel
 Gary L. Bright
 Jonathan Eric Briley
 Mark A. Brisman
 Paul Gary Bristow

Victoria Alvarez Brito
 Mark Francis Broderick
 Herman C. Broghammer
 Keith Broomfield
 Janice J. Brown
 Lloyd Brown
 Capt. Patrick J. Brown
 Bettina Browne
 Mark Bruce
 Richard Bruehert
 Andrew Brunn
 Capt. Vincent Brunton
 Ronald Paul Bucca
 Brandon J. Buchanan
 Greg Joseph Buck
 Dennis Buckley
 Nancy Bueche
 Patrick Joseph Buhse
 John E. Bulaga Jr.
 Stephen Bunin
 Matthew J. Burke
 Thomas Daniel Burke
 Capt. William F. Burke Jr.
 Donald James Burns
 Kathleen A. Burns
 Keith James Burns
 John Patrick Burnside
 Irina Buslo
 Milton Bustillo
 Thomas M. Butler
 Patrick Byrne
 Timothy G. Byrne
 Jesus Cabezas
 Lillian Caceres
 Brian Joseph Cachia
 Steven Cafiero Jr.
 Richard M. Caggiano
 Cecile M. Caguicla
 Michael John Cahill
 Scott W. Cahill
 Thomas J. Cahill
 George Cain
 Salvatore B. Calabro
 Joseph Calandrillo
 Philip V. Calcagno
 Edward Calderon
 Kenneth Marcus Caldwell
 Dominick E. Calia
 Felix (Bobby) Calixte
 Capt. Frank Callahan
 Liam Callahan
 Luigi Calvi
 Roko Camaj
 Michael Cammarata
 David Otey Campbell
 Geoffrey Thomas Campbell
 Jill Marie Campbell
 Robert Arthur Campbell
 Sandra Patricia Campbell
 Juan Ortega Campos
 Sean Canavan
 John A. Candela

Vincent Cangelosi
 Stephen J. Cangialosi
 Lisa B. Cannava
 Brian Cannizzaro
 Michael R. Canty
 Louis A. Caporicci
 Jonathan N. Cappello
 James Christopher Cappers
 Richard M. Caproni
 Jose Cardona
 Dennis M. Carey
 Edward Carlino
 Michael Scott Carlo
 David G. Carlone
 Rosemarie C. Carlson
 Mark Stephen Carney
 Joyce Ann Carpeneto
 Jeremy M. Carrington
 Michael T. Carroll
 Peter Carroll
 James J. Carson Jr.
 Christopher Newton Carter
 James Marcel Cartier
 Joel Cartridge
 Vivian Casalduc
 John F. Casazza
 Paul Cascio
 Margarito Casillas
 Thomas Anthony Casoria
 William Otto Caspar
 Alejandro Castano
 German Castillo Galicia
 Arcelia Castillo
 Leonard M. Castrianno
 Jose Ramon Castro
 Richard G. Catarelli
 Christopher Sean Caton
 Robert J. Caufield
 Mary Teresa Caulfield
 Judson Cavalier
 Michael Joseph Cawley
 Jason D. Cayne
 Juan Armando Ceballos
 Marcia G. Cecil-Carter
 Jason Cefalu
 Thomas J. Celic
 Ana M. Centeno
 Joni Cesta
 Jeffrey M. Chairnoff
 Swarna Chalasini
 William Chalcoff
 Eli Chalouh
 Charles Lawrence (Chip) Chan
 Mandy Chang
 Mark L. Charette
 Gregorio Manuel Chavez
 Pedro Francisco Checo
 Douglas MacMillan Cherry
 Stephen Patrick Cherry
 Vernon Paul Cherry
 Nestor Chevalier
 Swede Joseph Chevalier

Alexander H. Chiang
 Dorothy J. Chiarchiaro
 Luis Alfonso Chimbo
 Robert Chin
 Wing Wai (Eddie) Ching
 Nicholas P. Chiofalo Jr.
 John Chipura
 Peter A. Chirchirillo
 Catherine E. Chirls
 Kyung (Kaccy) Cho
 Abdul K. Chowdhury
 Mohammed Salahuddin Chowdhury
 Kirsten L. Christophe
 Pamela Chu
 Steven Paul Chucknick
 Wai-ching Chung
 Christopher Ciafardini
 Alex F. Ciccone
 Frances Ann Cilente
 Elaine Cillo
 Edna Cintron
 Nestor Andre Cintron
 Lt. Robert Dominick Cirri
 Benjamin Keefe Clark
 Eugene Clark
 Gregory A. Clark
 Mannie Leroy Clark
 Thomas R. Clark
 Christopher Robert Clarke
 Donna Clarke
 Michael Clarke
 Suria R.E. Clarke
 Kevin Francis Cleary
 James D. Cleere
 Geoffrey W. Cloud
 Susan M. Clyne
 Steven Coakley
 Jeffrey Coale
 Patricia A. Cody
 Daniel Michael Coffey
 Jason Matthew Coffey
 Florence Cohen
 Kevin Sanford Cohen
 Anthony Joseph Coladonato
 Mark J. Colaio
 Stephen J. Colaio
 Christopher M. Colasanti
 Kevin Nathaniel Colbert
 Michel Paris Colbert
 Keith Eugene Coleman
 Scott Thomas Coleman
 Tarel Coleman
 Liam Joseph Colhoun
 Robert D. Colin
 Robert J. Coll Jr.
 Jean Marie Collin
 John Michael Collins
 Michael L. Collins
 Thomas J. Collins
 Joseph Collison
 Patricia Malia Colodner
 Linda M. Colon

Soledi Colon
 Ronald Comer
 Jaime Concepcion
 Albert Conde
 Denease Conley
 Susan Clancy Conlon
 Margaret Mary Conner
 Cynthia L. Connolly
 John E. Connolly
 James Lee Connor
 Jonathan (J.C.) Connors
 Kevin P. Connors
 Kevin Francis Conroy
 Brenda E. Conway
 Dennis Michael Cook
 Helen D. Cook
 John A. Cooper
 Joseph J. Coppo Jr.
 Gerard J. Coppola
 Joseph Albert Corbett
 Alejandro Cordero
 Robert Cordice
 Davids Vargas Cordoba
 Ruben D. Correa
 Danny A. Correa-Gutierrez
 James Corrigan
 Carlos Cortes
 Kevin M. Cosgrove
 Dolores Marie Costa
 Digna Alexandra Rivera Costanza
 Charles Gregory Costello Jr.
 Michael S. Costello
 Conrod K.H. Cottoy Sr.
 Martin Coughlan
 Sgt. John Gerard Coughlin
 Timothy John Coughlin
 James E. Cove
 Andre Cox
 Frederick John Cox Jr.
 James Raymond Coyle
 Michelle Coyle-Eulau
 Anne M. Cramer
 Christopher Seton Cramer
 Denise Crant
 James L. Crawford Jr.
 Robert James Crawford
 Joanne Mary Cregan
 Lucia Crifasi
 Lt. John Crisci
 Daniel Hal Crisman
 Dennis A. Cross
 Helen Crossin-Kittle
 Kevin Raymond Crotty
 Thomas G. Crotty
 John Crowe
 Welles Remy Crowther
 Robert L. Cruikshank
 Francisco Cruz Sr.
 John Robert Cruz
 Kenneth John Cubas
 Francisco C. Cubero
 Richard Joseph Cudina

Neil James Cudmore
 Thomas Patrick Cullen III
 Joan McConnell Cullinan
 Joyce Cummings
 Brian Thomas Cummins
 Nilton Albuquerque Fernao Cunha
 Michael Joseph Cunningham
 Robert Curatolo
 Laurence Curia
 Paul Dario Curioli
 Beverly Curry
 Sgt. Michael Curtin
 Gavin Cushny
 Manuel Da Mota
 Caleb Arron Dack
 Carlos S. DaCosta
 John D'Allara
 Vincent D'Amadeo
 Thomas A. Damaskinos
 Jack L. D'Ambrosi Jr.
 Jeannine Marie Damiani-Jones
 Patrick W. Danahy
 Mary D'Antonio
 Vincent G. Danz
 Dwight Donald Darcy
 Elizabeth Ann Darling
 Annette Andrea Dataram
 Lt. Edward Alexander D'Atri
 Michael D. D'Auria
 Lawrence Davidson
 Michael Allen Davidson
 Scott Matthew Davidson
 Niurka Davila
 Clinton Davis Sr.
 Wayne Terrial Davis
 Anthony Richard Dawson
 Calvin Dawson
 Edward James Day
 Jayceryll M. de Chavez
 Nataly de la Cruz
 Emerita (Emy) De La Pena
 Azucena de la Torre
 Cristina de Laura
 Oscar de Laura
 Francis (Frank) Albert De Martini
 William T. Dean
 Robert J. DeAngelis Jr.
 Thomas P. Deangelis
 Tara Debek
 Anna Debin
 James V. DeBlase
 Paul DeCola
 Simon Dedvukaj
 Jason Christopher DeFazio
 David A. Defeo
 Jennifer DeJesus
 Monique E. DeJesus
 Nereida DeJesus
 Manuel Del Valle Jr.
 Donald A. Delapenha
 Vito Joseph Deleo
 Danielle Delie

Joseph A. Della Pietra
 Palmina Delli Gatti
 Colleen Ann Deloughery
 Anthony Demas
 Martin DeMeo
 Francis X. Deming
 Carol K. Demitz
 Kevin Dennis
 Thomas F. Dennis
 Jean C. DePalma
 Jose Nicholas Depena
 Robert J. Deraney
 Michael DeRienzo
 David Paul DeRubbio
 Jemal Legesse DeSantis
 Christian D. DeSimone
 Edward DeSimone III
 Lt. Andrew Desperito
 Michael Jude D'Esposito
 Cindy Ann Deuel
 Melanie Louise DeVere
 Jerry DeVito
 Robert P. Devitt Jr.
 Dennis Lawrence Devlin
 Gerard Dewan
 Simon Dhanani
 Michael L. DiAgostino
 Lourdes Galletti Diaz
 Matthew Diaz
 Nancy Diaz
 Obdulio Ruiz Diaz
 Michael Diaz-Piedra III
 Judith Belguese Diaz-Sierra
 Patricia F. DiChiario
 Joseph Dermot Dickey Jr.
 Lawrence Patrick Dickinson
 Michael David Diehl
 John DiFato
 Vincent F. DiFazio
 Carl DiFranco
 Donald J. DiFranco
 Alexandra Costanza Digna
 Debra Ann DiMartino
 Stephen P. Dimino
 William J. Dimmling
 Christopher Dincuff
 Jeffrey M. Dingle
 Anthony DiOnisio Jr.
 George DiPasquale
 Joseph DiPilato
 Douglas Frank DiStefano
 Ramzi A. Doany
 John J. Doherty
 Melissa C. Doi
 Brendan Dolan
 Neil Dollard
 James Joseph Domanico
 Benilda P. Domingo
 Charles Dominguez
 Geronimo (Jerome) Mark Patrick Dominguez
 Lt. Kevin W. Donnelly

Jacqueline Donovan
 Stephen Dorf
 Thomas Dowd
 Lt. Kevin Christopher Dowdell
 Mary Yolanda Dowling
 Ray M. Downey
 Frank Joseph Doyle
 Joseph M. Doyle
 Randy Drake
 Stephen Patrick Driscoll
 Mirna A. Duarte
 Luke A. Dudek
 Christopher Michael Duffy
 Gerard Duffy
 Michael Joseph Duffy
 Thomas W. Duffy
 Antoinette Duger
 Sareve Dukat
 Christopher Joseph Dunne
 Richard A. Dunstan
 Patrick Thomas Dwyer
 Joseph Anthony Eacobacci
 John Bruce Eagleson
 Robert D. Eaton
 Dean P. Eberling
 Margaret Ruth Echtermann
 Paul Robert Eckna
 Constantine (Gus) Economos
 Dennis Michael Edwards
 Michael Hardy Edwards
 Christine Egan
 Lisa Egan
 Capt. Martin Egan Jr.
 Michael Egan
 Samantha Egan
 Carole Eggert
 Lisa Caren Weinstein Ehrlich
 John Ernst (Jack) Eichler
 Eric Adam Eisenberg
 Daphne F. Elder
 Michael J. Elferis
 Mark J. Ellis
 Valerie Silver Ellis
 Albert Alfy William Elmarry
 Edgar H. Emery Jr.
 Doris Suk-Yuen Eng
 Christopher S. Epps
 Ulf Ramm Ericson
 Erwin L. Erker
 William J. Erwin
 Sarah (Ali) Escarcega
 Jose Espinal
 Fanny M. Espinoza
 Brigitte Ann Esposito
 Francis Esposito
 Lt. Michael Esposito
 William Esposito
 Ruben Esquilin Jr.
 Sadie Ette
 Barbara G. Etzold
 Eric Brian Evans
 Robert Edward Evans

Meredith Emily June Ewart
 Catherine K. Fagan
 Patricia M. Fagan
 Keith G. Fairben
 William F. Fallon Jr.
 William Fallon
 Anthony J. Fallone Jr.
 Dolores B. Fanelli
 John Joseph Fanning
 Kathleen (Kit) Faragher
 Capt. Thomas Farino
 Nancy Carole Farley
 Elizabeth Ann (Betty) Farmer
 Douglas Farnum
 John G. Farrell
 John W. Farrell
 Terrence Patrick Farrell
 Capt. Joseph Farrelly
 Thomas P. Farrelly
 Syed Abdul Fatha
 Christopher Faughnan
 Wendy R. Faulkner
 Shannon M. Fava
 Bernard D. Favuzza
 Robert Fazio Jr.
 Ronald C. Fazio
 William Feehan
 Francis J. (Frank) Feely
 Garth E. Feeney
 Sean B. Fegan
 Lee S. Fehling
 Peter Feidelberg
 Alan D. Feinberg
 Rosa Maria Feliciano
 Edward T. Fergus Jr.
 George Ferguson
 Henry Fernandez
 Jose Manuel Contreras Fernandez
 Judy H. Fernandez
 Elisa Giselle Ferraina
 Anne Marie Sallerin Ferreira
 Robert John Ferris
 David Francis Ferrugio
 Louis V. Fersini Jr.
 Mike Ferugio
 Bradley James Fetchet
 Jennifer Louise Fialco
 Kristen Fiedel
 Samuel Fields
 Michael Bradley Finnegan
 Timothy J. Finnerty
 Michael Curtis Fiore
 Stephen J. Fiorelli
 Paul M. Fiori
 John Fiorito
 Lt. John R. Fischer
 Andrew Fisher
 Bennett Lawson Fisher
 John Roger Fisher
 Thomas J. Fisher
 Lucy Fishman
 Ryan D. Fitzgerald

Thomas Fitzpatrick
 Richard P. Fitzsimons
 Salvatore A. Fiumefreddo
 Christina Donovan Flannery
 Eileen Flecha
 Andre G. Fletcher
 Carl Flickinger
 John Joseph Florio
 Joseph W. Flounders
 David Fodor
 Lt. Michael N. Fodor
 Steven Mark Fogel
 Thomas Foley
 David Fontana
 Chih Min (Dennis) Foo
 Del Rose Forbes-Cheatham
 Godwin Forde
 Donald A. Foreman
 Christopher Hugh Forsythe
 Claudia Alicia Martinez Foster
 Noel J. Foster
 Ana Fosteris
 Robert J. Foti
 Yolette Fouchet
 Jeffrey L. Fox
 Virginia Fox
 Joan Francis
 Pauline Francis
 Virgin (Lucy) Francis
 Gary J. Frank
 Morton Frank
 Peter Christopher Frank
 Richard K. Fraser
 Kevin Joseph Frawley
 Clyde Frazier Jr.
 Lillian I. Frederick
 Andrew Fredericks
 Jamitha Freeman
 Brett O. Freiman
 Lt. Peter L. Freund
 Arlene E. Fried
 Alan Wayne Friedlander
 Andrew K. Friedman
 Gregg J. Froehner
 Peter Christian Fry
 Clement Fumando
 Steven Elliot Furman
 Paul James Furmato
 Fredric Gabler
 Richard S. Gabrielle
 James Andrew Gadiel
 Pamela Gaff
 Ervin Vincent Gailliard
 Deanna L. Galante
 Grace Galante
 Anthony Edward Gallagher
 Daniel James Gallagher
 John Patrick Gallagher
 Tomas Gallegos Linares
 Cono E. Gallo
 Vincenzo Gallucci
 Thomas Edward Galvin

Giovanna (Genni) Gambale
 Thomas Gambino Jr.
 Giann F. Gamboa
 Peter J. Ganci Jr.
 Claude Michael Gann
 Lt. Charles William Garbarini
 Cesar Garcia
 David Garcia
 Jorge Luis Morron Garcia
 Juan Garcia
 Marlyn C. Garcia
 Christopher Gardner
 Douglas B. Gardner
 Harvey J. Gardner III
 Jeffrey B. Gardner
 Thomas A. Gardner
 William Arthur Gardner
 Francesco Garfi
 Rocco Gargano
 James M. Gartenberg
 Matthew David Garvey
 Bruce Gary
 Boyd A. Gatton
 Donald Richard Gavagan Jr.
 Terence D. Gazzani
 Gary Geidel
 Paul Hamilton Geier
 Julie M. Geis
 Peter Gelinas
 Steven Paul Geller
 Howard G. Gelling Jr.
 Peter Victor Genco
 Steven Gregory Genovese
 Alayne F. Gentul
 Edward F. Geraghty
 Suzanne Geraty
 Ralph Gerhardt
 Robert J. Gerlich
 Denis P. Germain
 Marina R. Gertsberg
 Susan M. Getzendanner
 James Gerard Geyer
 Joseph M. Giaccone
 Lt. Vincent Francis Giammona
 Debra L. Gibbon
 James A. Giberson
 Craig Neil Gibson
 Ronnie Gies
 Laura A. Giglio
 Andrew Clive Gilbert
 Timothy Paul Gilbert
 Paul Stuart Gilbey
 Paul John Gill
 Mark Y. Gilles
 Evan H. Gillette
 Ronald Gilligan
 Sgt. Rodney C. Gillis
 Laura Gilly
 Lt. John F. Ginley
 Donna Marie Giordano
 Jeffrey Giordano
 John Giordano

Steven A. Giorgetti
 Martin Giovinnazzo
 Jinny Lady Giraldo
 Kum-Kum Girolamo
 Salvatore Gitto
 Cynthia Giugliano
 Mon Gjonbalaj
 Dianne Gladstone
 Keith Alexander Glascoe
 Thomas I. Glasser
 Harry Glenn
 Barry H. Glick
 Steven Lawrence Glick
 John T. Gnazzo
 William (Bill) Robert Godshalk
 Michael Gogliormella
 Brian Fredric Goldberg
 Jeffrey Grant Goldflam
 Michelle Herman Goldstein
 Monica Goldstein
 Steven Goldstein
 Andrew H. Golkin
 Dennis James Gomes
 Enrique Antonio Gomez
 Jose Bienvenido Gomez
 Manuel Gomez Jr.
 Wilder Gomez
 Ana Irene Medina Gonzalez
 Jenine Gonzalez
 Joel Guevara Gonzalez
 Mauricio Gonzalez
 Rosa J. Gonzalez
 Calvin J. Gooding
 Harry Goody
 Kiran Reddy Gopu
 Catherine Carmen Gorayeb
 Kerene Gordon
 Sebastian Gorki
 Kieran Gorman
 Thomas E. Gorman
 Michael Edward Gould
 Yugi Goya
 Jon Richard Grabowski
 Christopher Michael Grady
 Edwin John Graf III
 David M. Graifman
 Gilbert Granados
 Elvira Granitto
 Winston Arthur Grant
 Christopher Stewart Gray
 James Michael Gray
 Linda Mair Grayling
 John Michael Grazioso
 Timothy Grazioso
 Derrick Arthur Green
 Wade Brian Green
 Elaine Myra Greenberg
 Gayle R. Greene
 James Arthur Greenleaf Jr.
 Eileen Marsha Greenstein
 Elizabeth (Lisa) Martin Gregg
 Denise Gregory

Donald H. Gregory
 Florence M. Gregory
 Pedro (David) Grehan
 John M. Griffin
 Tawanna Griffin
 Joan D. Griffith
 Warren Grifka
 Ramon Grijalvo
 Joseph F. Grillo
 David Grimner
 Kenneth Grouzalis
 Joseph Grzelak
 Matthew J. Grzymalski
 Robert Joseph Gschaar
 Liming (Michael) Gu
 Jose A. Guadalupe
 Yan Zhu (Cindy) Guan
 Geoffrey E. Guja
 Lt. Joseph Gullickson
 Babita Guman
 Douglas B. Gurian
 Janet H. Gustafson
 Philip T. Guza
 Sabita Guzman
 Barbara Guzzardo
 Peter Gyulavary
 Gary Robert Haag
 Andrea Lyn Haberman
 Barbara M. Habib
 Philip Haentzler
 Nizam A. Hafiz
 Karen Hagerty
 Steven Hagis
 Mary Lou Hague
 David Halderman Jr.
 Maile Rachel Hale
 Richard Hall
 Vaswald George Hall
 Robert John Halligan
 Lt. Vincent Gerard Halloran
 James D. Halvorson
 Mohammed Salman Hamdani
 Felicia Hamilton
 Robert Hamilton
 Frederic Kim Han
 Christopher James Hanley
 Sean Hanley
 Valerie Joan Hanna
 Thomas Hannafin
 Kevin James Hannaford
 Michael L. Hannan
 Dana Hannon
 Vassilios G. Haramis
 James A. Haran
 Jeffrey P. Hardy
 Timothy John Hargrave
 Daniel Harlin
 Frances Haros
 Lt. Harvey L. Harrell
 Lt. Stephen Gary Harrell
 Aisha Harris
 Stewart D. Harris

John Patrick Hart
 John Clinton Hartz
 Emeric J. Harvey
 Capt. Thomas Theodore Haskell Jr.
 Timothy Haskell
 Joseph John Hasson III
 Leonard William Hatton Jr.
 Capt. Terence S. Hatton
 Michael Helmut Haub
 Timothy Aaron Haviland
 Donald G. Havlish Jr.
 Anthony Hawkins
 Nobuhiro Hayatsu
 Philip Hayes
 William Ward Haynes
 Scott Hazelcorn
 Lt. Michael K. Healey
 Roberta Bernstein Heber
 Charles Francis Xavier Heeran
 John Heffernan
 Howard Joseph Heller Jr.
 JoAnn L. Heltibridle
 Mark F. Hemschoot
 Ronnie Lee Henderson
 Janet Hendricks
 Brian Hennessey
 Michelle Marie Henrique
 Joseph P. Henry
 William Henry
 John Henwood
 Robert Allan Hepburn
 Mary (Molly) Herencia
 Lindsay Coates Herkness III
 Harvey Robert Hermer
 Anabel Hernandez
 Claribel Hernandez
 Eduardo Hernandez
 Norberto Hernandez
 Raul Hernandez
 Gary Herold
 Jeffrey A. Hersch
 Thomas Hetzel
 Capt. Brian Hickey
 Ysidro Hidalgo-Tejada
 Lt. Timothy Higgins
 Robert D. Higley II
 Todd Russell Hill
 Clara Victorine Hinds
 Neal Hinds
 Mark D. Hindy
 Katsuyuki Hirai
 Heather Malia Ho
 Tara Yvette Hobbs
 Thomas A. Hobbs
 James L. Hobin
 Robert Wayne Hobson III
 DaJuan Hodges
 Ronald George Hoerner
 Patrick Aloysius Hoey
 Frederick J. Hoffman
 Joseph Hoffman
 Marcia Hoffman

Michele L. Hoffman
 Stephen G. Hoffman
 Judith Florence Hofmiller
 Thomas Warren Hohlweck Jr.
 Jonathan R. Hohmann
 John Holland
 Joseph Francis Holland III
 Elizabeth Holmes
 Thomas P. Holohan Jr.
 Bradley Hoorn
 James P. Hopper
 Montgomery McCullough Hord
 Michael Horn
 Matthew D. Horning
 Robert L. Horohoe Jr.
 Aaron Horwitz
 Charles J. Houston
 Uhuru G. Houston
 George Howard
 Michael C. Howell
 Steven L. Howell
 Jennifer L. Howley
 Milagros Hromada
 Marian Hrycak
 Stephen Huczko Jr.
 Kris R. Hughes
 Melissa Harrington Hughes
 Paul R. Hughes
 Robert T. "Bobby" Hughes Jr.
 Thomas F. Hughes
 Timothy Robert Hughes
 Susan Huie
 Mychal Lamar Hulse
 Kathleen (Casey) Hunt
 William C. Hunt
 Joseph G. Hunter
 Robert Hussa
 Thomas E. Hynes
 Capt. Walter Hynes
 Joseph Anthony Ianelli
 Zuhtu Ibis
 Jonathan Lee Ielpi
 Michael Patrick Iken
 Daniel Ilkanayev
 Capt. Frederick Ill Jr.
 Abraham Nethanel Ilowitz
 Anthony P. Infante Jr.
 Louis S. Inghilterra
 Christopher N. Ingrassia
 Paul Innella
 Stephanie V. Irby
 Douglas Irgang
 Kristin A. Irvine-Ryan
 Todd A. Isaac
 Erik Hans Isbrandtsen
 William Iselepis Jr.
 Taizo Ishikawa
 Aram Iskenderian Jr.
 John Iskyan
 Kazushige Ito
 Aleksandr Valeryerich Ivantsov
 Virginia Jablonski

Brooke Alexandra Jackman
 Aaron Jacobs
 Ariel Louis Jacobs
 Jason Kyle Jacobs
 Michael Grady Jacobs
 Steven A. Jacobson
 Ricknauth Jaggernauth
 Jake Denis Jagoda
 Yudh V.S. Jain
 Maria Jakubiak
 Ernest James
 Gricelda E. James
 Mark Jardim
 Mohammed Jawara
 Francois Jean-Pierre
 Maxima Jean-Pierre
 Paul E. Jeffers
 Joseph Jenkins Jr.
 Alan K. Jensen
 Prem N. Jerath
 Farah Jeudy
 Hweidar Jian
 Fernando Jimenez Molina
 Eliezer Jimenez Jr.
 Luis Jimenez Jr.
 Charles Gregory John
 Nicholas John
 LaShawana Johnson
 Scott M. Johnson
 William Johnston
 Allison Horstmann Jones
 Arthur Joseph Jones III
 Brian L. Jones
 Christopher D. Jones
 Donald T. Jones
 Donald W. Jones
 Linda Jones
 Mary S. Jones
 Andrew Jordan
 Robert Thomas Jordan
 Albert Joseph
 Ingeborg Joseph
 Karl Henri Joseph
 Stephen Joseph
 Jane Eileen Josiah
 Lt. Anthony Jovic
 Angel Luis Juarbe Jr.
 Karen Susan Juday
 Rev. Mychal Judge
 Paul W. Jurgens
 Thomas Edward Jurgens
 Shashi Kiran Lakshmikantha Kadaba
 Gavkharoy Mukhometovna
 Kamardinova
 Shari Kandell
 Howard Lee Kane
 Jennifer Lynn Kane
 Vincent D. Kane
 Joon Koo Kang
 Sheldon R. Kanter
 Deborah H. Kaplan
 Alvin Peter Kappelmann Jr.

Charles Karczewski
 William A. Karnes
 Douglas G. Karpiloff
 Charles L. Kasper
 Andrew Kates
 John Katsimatides
 Sgt. Robert Kaulfers
 Don Jerome Kauth Jr.
 Hideya Kawauchi
 Edward T. Keane
 Richard M. Keane
 Lisa Kearney-Griffin
 Karol Ann Keasler
 Paul Hanlon Keating
 Leo Russell Keene III
 Joseph J. Keller
 Peter Rodney Kellerman
 Joseph P. Kellett
 Frederick H. Kelley
 James Joseph Kelly
 Joseph A. Kelly
 Maurice Patrick Kelly
 Richard John Kelly Jr.
 Thomas Michael Kelly
 Thomas Richard Kelly
 Thomas W. Kelly
 Timothy C. Kelly
 William Hill Kelly Jr.
 Robert C. (Bob) Kennedy
 Thomas J. Kennedy
 John Keohane
 Lt. Ronald T. Kerwin
 Howard L. Kestenbaum
 Douglas D. Ketcham
 Ruth E. Ketler
 Boris Khalif
 Sarah Khan
 Taimour Firaz Khan
 Rajesh Khandelwal
 Bhowanie Devi Khemraj
 SeiLai Khoo
 Michael Kiefer
 Satoshi Kikuchihara
 Andrew Jay-Hoon Kim
 Lawrence Don Kim
 Mary Jo Kimelman
 Andrew Marshall King
 Lucille T. King
 Robert King Jr.
 Lisa M. King-Johnson
 Takashi Kinoshita
 Chris Michael Kirby
 Howard (Barry) Kirschbaum
 Glenn Davis Kirwin
 Richard J. Klars
 Peter A. Klein
 Alan D. Kleinberg
 Karen J. Klitzman
 Ronald Philip Kloepfer
 Andrew Knox
 Thomas Patrick Knox
 Yevgeny Knyazev

Rebecca Lee Koborie
 Deborah Kobus
 Gary Edward Koecheler
 Frank J. Koestner
 Ryan Kohart
 Vanessa Lynn Kolpak
 Irina Kolpakova
 Suzanne Kondratenko
 Abdoulaye Kone
 Bon-seok Koo
 Dorota Kopiczko
 Scott Kopytko
 Bojan Kostic
 Danielle Kousoulis
 John J. Kren
 William Krukowski
 Lyudmila Ksido
 Shekhar Kumar
 Kenneth Kumpel
 Frederick Kuo Jr.
 Patricia Kuras
 Nauka Kushitani
 Thomas Joseph Kuveikis
 Victor Kwarkye
 Kui Fai Kwok
 Angela R. Kyte
 Amarnauth Lachhman
 Andrew LaCorte
 Ganesh Ladkat
 James P. Ladley
 Joseph A. Lafalce
 Jeanette LaFond-Menichino
 David LaForge
 Michael Patrick LaForte
 Alan Lafranco
 Juan Lafuente
 Neil K. Lai
 Vincent A. Laieta
 William David Lake
 Franco Lalama
 Chow Kwan Lam
 Stephen LaMantia
 Amy Hope Lamonsoff
 Robert T. Lane
 Brendan M. Lang
 Rosanne P. Lang
 Vanessa Langer
 Mary Lou Langley
 Peter J. Langone
 Thomas Langone
 Michele B. Lanza
 Ruth Sheila Lapin
 Carol Ann LaPlante
 Ingeborg Astrid Desiree Lariby
 Robin Larkey
 Christopher Randall Larrabee
 Hamidou S. Larry
 Scott Larsen
 John Adam Larson
 Gary E. Lasko
 Nicholas C. Lassman
 Paul Laszczyński

Jeffrey Latouche
 Charles Laurencin
 Stephen James Lauria
 Maria Lavache
 Denis F. Lavelle
 Jeannine M. LaVerde
 Anna A. Laverty
 Steven Lawn
 Robert A. Lawrence
 Nathaniel Lawson
 Eugen Lazar
 James Patrick Leahy
 Lt. Joseph Gerard Leavey
 Neil Leavy
 Leon Lebor
 Kenneth Charles Ledee
 Alan J. Lederman
 Elena Ledesma
 Alexis Leduc
 David S. Lee
 Gary H. Lee
 Hyun-joon (Paul) Lee
 Jong-min Lee
 Juanita Lee
 Kathryn Blair Lee
 Linda C. Lee
 Lorraine Lee
 Myung-woo Lee
 Richard Y.C. Lee
 Stuart (Soo-Jin) Lee
 Yang Der Lee
 Stephen Lefkowitz
 Adriana Legro
 Edward J. Lehman
 Eric Andrew Lehrfeld
 David Ralph Leistman
 David Prudencio LeMagne
 Joseph A. Lenihan
 John J. Lennon Jr.
 John Robinson Lenoir
 Jorge Luis Leon
 Matthew Gerard Leonard
 Michael Lepore
 Charles Antoine Lesperance
 Jeffrey Earle LeVeen
 John D. Levi
 Alisha Caren Levin
 Neil D. Levin
 Robert M. Levine
 Robert Levine
 Shai Levinhar
 Adam J. Lewis
 Margaret Susan Lewis
 Ye Wei Liang
 Orasri Liangthanasarn
 Daniel F. Libretti
 Ralph M. Licciardi
 Edward Lichtschein
 Steven B. Lillianthal
 Carlos R. Lillo
 Craig Damian Lilore
 Arnold A. Lim

Darya Lin
 Wei Rong Lin
 Nickie L. Lindo
 Thomas V. Linehan Jr.
 Robert Thomas Linnane
 Alan Linton Jr.
 Diane Theresa Lipari
 Kenneth P. Lira
 Francisco Alberto Liriano
 Lorraine Lisi
 Paul Lisson
 Vincent Litto
 Ming-Hao Liu
 Joseph Livera
 Nancy Liz
 Harold Lizcano
 Martin Lizzul
 George A. Llanes
 Elizabeth Claire Logler
 Catherine Lisa Loguidice
 Jerome Robert Lohez
 Michael W. Lomax
 Laura M. Longing
 Salvatore Lopes
 Daniel Lopez
 George Lopez
 Luis Lopez
 Manuel L. Lopez
 Joseph Lostrangio
 Chet Louie
 Stuart Seid Louis
 Joseph Lovero
 Michael W. Lowe
 Garry Lozier
 John Peter Lozowsky
 Charles Peter Lucania
 Edward (Ted) H. Luckett II
 Mark G. Ludvigsen
 Lee Charles Ludwig
 Sean Thomas Lugano
 Daniel Lugo
 Marie Lukas
 William Lum Jr.
 Michael P. Lunden
 Christopher Lunder
 Anthony Luparello
 Gary Lutnick
 Linda Luzzicone
 Alexander Lygin
 Farrell Peter Lynch
 James Francis Lynch
 Louise A. Lynch
 Michael F. Lynch
 Michael Francis Lynch
 Michael Lynch
 Richard Dennis Lynch Jr.
 Robert H. Lynch
 Sean Patrick Lynch
 Sean Lynch
 Michael J. Lyons
 Monica Lyons
 Patrick Lyons

Robert Francis Mace
Jan Maciejewski
Catherine Fairfax MacRae
Richard B. Madden
Simon Maddison
Noell Maerz
Jeannieann Maffeo
Joseph Maffeo
Jay Robert Magazine
Brian Magee
Charles Wilson Magee
Joseph Maggitti
Ronald E. Magnuson
Daniel L. Maher
Thomas Anthony Mahon
William Mahoney
Joseph Maio
Takashi Makimoto
Abdu Malahi
Debora Maldonado
Myrna T. Maldonado-Agosto
Alfred R. Maler
Gregory James Malone
Edward Francis (Teddy) Maloney III
Joseph E. Maloney
Gene E. Maloy
Christian Maltby
Francisco Miguel (Frank) Mancini
Joseph Mangano
Sara Elizabeth Manley
Debra M. Mannetta
Marion Victoria (vickie) Manning
Terence J. Manning
James Maounis
Joseph Ross Marchbanks Jr.
Peter Edward Mardikian
Edward Joseph Mardovich
Lt. Charles Joseph Margiotta
Kenneth Joseph Marino
Lester Vincent Marino
Vita Marino
Kevin D. Marlo
Jose J. Marrero
John Marshall
James Martello
Michael A. Marti
Lt. Peter Martin
William J. Martin Jr.
Brian E. Martineau
Betsy Martinez
Edward J. Martinez
Jose Martinez
Robert Gabriel Martinez
Lizie Martinez-Calderon
Lt. Paul Richard Martini
Joseph A. Mascali
Bernard Mascarenhas
Stephen F. Masi
Nicholas G. Massa
Patricia A. Massari
Michael Massaroli
Philip W. Mastrandrea Jr.

Rudolph Mastrocinque
Joseph Mathai
Charles William Mathers
William A. Mathesen
Marcello Matricciano
Margaret Elaine Mattic
Robert D. Mattson
Walter Matuza
Charles A. (Chuck) Mauro Jr.
Charles J. Mauro
Dorothy Mauro
Nancy T. Mauro
Tyrone May
Keithroy Maynard
Robert J. Mayo
Kathy Nancy Mazza-Delosh
Edward Mazzella Jr.
Jennifer Mazzotta
Kaaria Mbaya
James J. McAlary Jr.
Brian McAleese
Patricia A. McAneney
Colin Richard McArthur
John McAvoy
Kenneth M. McBrayer
Brendan McCabe
Michael J. McCabe
Thomas McCann
Justin McCarthy
Kevin M. McCarthy
Michael Desmond McCarthy
Robert Garvin McCarthy
Stanley McCaskill
Katie Marie McCloskey
Tara McCloud-Gray
Charles Austin McCrann
Tonyell McDay
Matthew T. McDermott
Joseph P. McDonald
Brian G. McDonnell
Michael McDonnell
John F. McDowell Jr.
Eamon J. McEneaney
John Thomas McErlean
Katherine (Katie) McGarry-Noack
Daniel F. McGinley
Mark Ryan McGinly
Lt. William E. McGinn
Thomas H. McGinnis
Michael Gregory McGinty
Ann McGovern
Scott Martin McGovern
William J. McGovern
Stacey S. McGowan
Francis Noel McGuinn
Patrick J. McGuire
Thomas M. McHale
Keith McHeffey
Ann M. McHugh
Denis J. McHugh III
Dennis P. McHugh
Michael Edward McHugh Jr.

Robert G. McIlvaine
Donald James McIntyre
Stephanie McKenna
Barry J. McKeon
Evelyn C. McKinnedy
Darryl Leron McKinney
George Patrick McLaughlin Jr.
Robert C. McLaughlin Jr.
Gavin McMahon
Robert Dismas McMahon
Edmund M. McNally
Daniel McNeal
Walter Arthur McNeil
Christine Sheila McNulty
Sean Peter McNulty
Robert William McPadden
Terence A. McShane
Timothy Patrick McSweeney
Martin E. McWilliams
Rocco A. Medaglia
Abigail Medina
Anna Iris Medina
Deborah Medwig
Damian Meehan
William J. Meehan Jr.
Alok Mehta
Raymond Meisenheimer
Manuel Emilio Mejia
Eskedar Melaku
Antonio Melendez
Mary Melendez
Yelena Melnichenko
Stuart Todd Meltzer
Diarelia Jovannah Mena
Charles Mendez
Lizette Mendoza
Shevonne Mentis
Steve Mercado
Wesley Mercer
Ralph Joseph Mercurio
Alan H. Merdinger
George C. Merino
Yamel Merino
George Merkouris
Deborah Merrick
Raymond J. Metz III
Jill A. Metzler
David Robert Meyer
Nurul Huq Miah
William Edward Micciulli
Martin Paul Michelstein
Luis Clodoaldo Revilla Mier
Peter T. Milano
Gregory Milanowycz
Lukasz T. Milewski
Corey Peter Miller
Craig James Miller
Douglas C. Miller
Henry Miller Jr.
Joel Miller
Michael Matthew Miller
Phillip D. Miller

Robert Alan Miller
 Robert C. Miller Jr.
 Benjamin Millman
 Charles M. Mills Jr.
 Ronald Keith Milstein
 Robert Minara
 William G. Minardi
 Louis Joseph Minervino
 Thomas Mingione
 Nana Akwasi Minkah
 Wilbert Miraille
 Domenick Mircovich
 Rajesh A. Mirpuri
 Joseph Mistrulli
 Susan Miskowicz
 Lt. Paul Thomas Mitchell
 Richard Miuccio
 Frank V. Moccia Sr.
 Capt. Louis Joseph Modafferi
 Boyie Mohammed
 Lt. Dennis Mojica
 Manuel Mojica
 Kleber Rolando Molina
 Manuel Dejesus Molina
 Carl Molinaro
 Justin J. Molisani Jr.
 Brian Patrick Monaghan
 Franklin Monahan
 John Gerard Monahan
 Kristen Montanaro
 Craig D. Montano
 Michael Montesi
 Cheryl Ann Monyak
 Capt. Thomas Moody
 Sharon Moore
 Krishna Moorthy
 Abner Morales
 Carlos Morales
 Paula Morales
 John Christopher Moran
 John Moran
 Kathleen Moran
 Lindsay S. Morehouse
 George Morell
 Steven P. Morello
 Vincent S. Morello
 Arturo Alva Moreno
 Yvette Nicole Moreno
 Dorothy Morgan
 Richard Morgan
 Nancy Morgenstern
 Sanae Mori
 Blanca Morocho
 Leonel Morocho
 Dennis G. Moroney
 Lynne Irene Morris
 Seth A. Morris
 Stephen Philip Morris
 Christopher M. Morrison
 Ferdinand V. Morrone
 William David Moskal
 Marco Motroni Sr.

Chung Mou
 Iouri A. Mouchinski
 Jude J. Moussa
 Peter C. Moutos
 Damion Mowatt
 Christopher Mozzillo
 Stephen V. Mulderry
 Richard Muldowney Jr.
 Michael D. Mullan
 Dennis Michael Mulligan
 Peter James Mulligan
 Michael Joseph Mullin
 James Donald Munhall
 Nancy Muniz
 Carlos Mario Munoz
 Theresa (Terry) Munson
 Robert M. Murach
 Cesar Augusto Murillo
 Marc A. Murolo
 Brian Joseph Murphy
 Charles Murphy
 Christopher W. Murphy
 Edward C. Murphy
 James E. Murphy IV
 James Thomas Murphy
 Kevin James Murphy
 Patrick Sean Murphy
 Lt. Raymond E. Murphy
 Robert Eddie Murphy Jr.
 John Joseph Murray
 John Joseph Murray
 Susan D. Murray
 Valerie Victoria Murray
 Yuriy Mushynskiy
 Richard Todd Myhre
 Lt. Robert B. Nagel
 Takuya Nakamura
 Alexander J.R. Napier
 Frank Joseph Naples III
 John Napolitano
 Catherine A. Nardella
 Mario Nardone Jr.
 Manika Narula
 Narender Nath
 Karen S. Navarro
 Joseph M. Navas
 Francis J. Nazario
 Glenroy Neblett
 Marcus R. Neblett
 Jerome O. Nedd
 Laurence Nedell
 Luke G. Nee
 Pete Negron
 Ann Nicole Nelson
 David William Nelson
 James Nelson
 Michele Ann Nelson
 Peter Allen Nelson
 Oscar Nesbitt
 Gerard Terence Nevins
 Nancy Yuen Ngo
 Jody Tepedino Nichilo

Martin Niederer
 Alfonse J. Niedermeyer III
 Frank John Niestadt Jr.
 Gloria Nieves
 Juan Nieves Jr.
 Troy Edward Nilsen
 Paul R. Nimbley
 John Ballantine Niven
 Curtis Terrence Noel
 Daniel R. Nolan
 Robert Walter Noonan
 Daniela R. Notaro
 Brian Novotny
 Soichi Numata
 Brian Felix Nunez
 Jose R. Nunez
 Jeffrey Nussbaum
 James A. Oakley
 Dennis Oberg
 James P. O'Brien Jr.
 Michael O'Brien
 Scott J. O'Brien
 Timothy Michael O'Brien
 Lt. Daniel O'Callaghan
 Jefferson Ocampo
 Dennis J. O'Connor Jr.
 Diana J. O'Connor
 Keith K. O'Connor
 Richard J. O'Connor
 Amy O'Doherty
 Marni Pont O'Doherty
 Douglas Oelschlager
 Takashi Ogawa
 Albert Ogletree
 Philip Paul Ognibene
 James Andrew O'Grady
 Joseph J. Ogren
 Lt. Thomas O'Hagan
 Samuel Oitice
 Patrick O'Keefe
 Capt. William O'Keefe
 Gerald Michael Olcott
 Gerald O'Leary
 Christine Anne Olender
 Elsy Carolina Osorio Oliva
 Linda Mary Oliva
 Edward K. Oliver
 Leah E. Oliver
 Eric T. Olsen
 Jeffrey James Olsen
 Maureen L. Olson
 Steven John Olson
 Matthew Timothy O'Mahoney
 Toshihiro Onda
 Seamus L. O'Neal
 John P. O'Neill Sr.
 Peter J. O'Neill Jr.
 Sean Gordon Corbett O'Neill
 Michael C. Opperman
 Christopher Orgielewicz
 Margaret Orloske
 Virginia A. Ormiston-Kenworthy

Kevin O'Rourke	Dipti Patel	Josh Piver
Juan Romero Orozco	Manish K. Patel	Joseph Plumitallo
Ronald Orsini	Steven B. Paterson	John M. Pocher
Peter K. Ortale	James Matthew Patrick	William Howard Pohlmann
Alexander Ortiz	Manuel Patrocino	Laurence M. Polatsch
David Ortiz	Bernard E. Patterson	Thomas H. Polhemus
Emilio (Peter) Ortiz Jr.	Cira Marie Patti	Steve Pollicino
Pablo Ortiz	Robert Edward Pattison	Susan M. Pollio
Paul Ortiz Jr.	James R. Paul	Joshua Poptean
Sonia Ortiz	Patrice Paz	Giovanna Porras
Masaru Ose	Sharon Cristina Millan Paz	Anthony Portillo
Patrick J. O'Shea	Victor Paz-Gutierrez	James Edward Potorti
Robert W. O'Shea	Stacey L. Peak	Daphne Pouletsos
James Robert Ostrowski	Richard Allen Pearlman	Richard Poulos
Timothy O'Sullivan	Durrell Pearsall Jr.	Stephen E. Poulos
Jason Douglas Oswald	Thomas E. Pedicini	Brandon Jerome Powell
Michael Otten	Todd D. Pelino	Shawn Edward Powell
Isidro Ottenwalder	Michel Adrian Pelletier	Tony Pratt
Michael Ou	Anthony Peluso	Gregory M. Preziose
Todd Joseph Ouida	Angel Ramon Pena	Wanda Ivelisse Prince
Jesus Ovalles	Jose D. Pena	Vincent Princiotta
Peter J. Owens Jr.	Richard Al Penny	Kevin Prior
Adianes Oyola	Salvatore F. Pepe	Everett Martin (Marty) Proctor III
Angel M. Pabon	Carl Allen Peralta	Carrie B. Progen
Israel Pabon	Robert David Peraza	David Lee Pruim
Roland Pacheco	Jon A. Perconti	Richard Prunty
Michael Benjamin Packer	Alejo Perez	John F. Puckett
Deepa K. Pakkala	Angel Perez Jr.	Robert D. Pugliese
Jeffrey Matthew Palazzo	Angela Susan Perez	Edward F. Pullis
Thomas Anthony Palazzo	Anthony Perez	Patricia Ann Puma
Richard (Rico) Palazzolo	Ivan Perez	Hemanth Kumar Puttur
Orio Joseph Palmer	Nancy E. Perez	Edward R. Pykon
Frank A. Palombo	Joseph John Perroncino	Christopher Quackenbush
Alan N. Palumbo	Edward J. Perrotta	Lars Peter Qualben
Christopher M. Panatier	Emelda Perry	Lincoln Quappe
Dominique Pandolfo	Lt. Glenn C. Perry	Beth Ann Quigley
Paul Pansini	John William Perry	Lt. Michael Quilty
John M. Paolillo	Franklin Allan Pershep	James Francis Quinn
Edward J. Papa	Daniel Pesce	Ricardo Quinn
Salvatore Papasso	Michael J. Pescherine	Carol Rabalais
James N. Pappageorge	Davin Peterson	Christopher Peter A. Racaniello
Vinod K. Parakat	William Russel Peterson	Leonard Ragaglia
Vijayashanker Paramsothy	Mark Petrocelli	Eugene J. Raggio
Nitin Parandkar	Lt. Philip S. Petti	Laura Marie Ragonese-Snik
Hardai (Casey) Parbhu	Glen Kerrin Pettit	Michael Ragusa
James Wendell Parham	Dominick Pezzulo	Peter F. Raimondi
Debra (Debbie) Paris	Kaleen E. Pezzuti	Harry A. Raines
George Paris	Lt. Kevin Pfeifer	Ehtesham U. Raja
Gye-Hyong Park	Tu-Anh Pham	Valsa Raju
Philip L. Parker	Lt. Kenneth John Phelan	Edward Rall
Michael A. Parkes	Eugenia Piantieri	Lukas (Luke) Rambousek
Robert Emmett Parks Jr.	Ludwig John Picarro	Julio Fernandez Ramirez
Hasmukhrai Chuckulal Parmar	Matthew Picerno	Maria Isabel Ramirez
Robert Parro	Joseph O. Pick	Harry Ramos
Diane Marie Moore Parsons	Christopher Pickford	Vishnoo Ramsaroop
Leobardo Lopez Pascual	Dennis J. Pierce	Lorenzo Ramzey
Michael J. Pascuma Jr.	Bernard T. Pietronico	A. Todd Rancke
Jerrold H. Paskins	Nicholas P. Pietruni	Adam David Rand
Horace Robert Passananti	Theodoros Pigis	Jonathan C. Randall
Suzanne H. Passaro	Susan Elizabeth Ancona Pinto	Srinivasa Shreyas Ranganath
Victor Antonio Martinez Pastrana	Joseph Piskadlo	Anne Rose T. Ransom
Avnish Ramanbhai Patel	Christopher Todd Pitman	Faina Rapoport

Robert Arthur Rasmussen
 Amenia Rasool
 Roger Mark Rasweiler
 David Alan James Rathkey
 William Ra:ph Raub
 Gerard Rauzi
 Alexey Razuvaev
 Gregory Reda
 Sarah (Prothero) Redheffer
 Michele Reed
 Judith A. Reese
 Donald J. Regan
 Lt. Robert M. Regan
 Thomas M. Regan
 Christian Michael Otto Regenhard
 Howard Reich
 Gregg Reidy
 James B. Reilly
 Kevin O. Reilly
 Timothy E. Reilly
 Joseph Reina Jr.
 Thomas Barnes Reinig
 Frank B. Reisman
 Joshua Scott Reiss
 Karen Renda
 John Armand Reo
 Richard Rescorla
 John Thomas Resta
 Eduvigis (Eddie) Reyes
 Bruce A. Reynolds
 John Frederick Rhodes
 Francis S. Riccardelli
 Rudolph N. Riccio
 AnnMarie (Davi) Riccoboni
 David Rice
 Eileen Mary Rice
 Kenneth F. Rice III
 Lt. Vernon Allan Richard
 Claude D. Richards
 Gregory Richards
 Michael Richards
 Venesha O. Richards
 James C. Riches
 Alan Jay Richman
 John M. Rigo
 James Riley
 Theresa (Ginger) Risco
 Rose Mary Riso
 Moises N. Rivas
 Joseph Rivelli Jr.
 Carmen A. Rivera
 Isaias Rivera
 Juan William Rivera
 Linda Rivera
 David E. Rivers
 Joseph R. Riverso
 Paul Rizza
 John Frank Rizzo
 Stephen Louis Roach
 Joseph Roberto
 Leo A. Roberts
 Michael Edward Roberts

Michael Roberts
 Donald Walter Robertson Jr.
 Catherina Robinson
 Jeffrey Robinson
 Michell Lee Robotham
 Donald Robson
 Antonio Augusto Tome Rocha
 Raymond J. Rocha
 Laura Rockefeller
 John M. Rodak
 Antonio Jose Carrusca Rodrigues
 Anthony Rodriguez
 Carlos Cortez Rodriguez
 Carmen Milagros Rodriguez
 Gregory E. Rodriguez
 Marsha A. Rodriguez
 Richard Rodriguez
 David B. Rodriguez-Vargas
 Matthew Rogan
 Karlie Barbara Rogers
 Scott Rohner
 Keith Roma
 Joseph M. Romagnolo
 Efrain Franco Romero Sr.
 Elvin Santiago Romero
 James A. Romito
 Sean Rooney
 Eric Thomas Ropiteau
 Wendy Alice Rosario Wakeford
 Aida Rosario
 Angela Rosario
 Mark H. Rosen
 Brooke David Rosenbaum
 Linda Rosenbaum
 Sheryl Lynn Rosenbaum
 Lloyd D. Rosenberg
 Mark Louis Rosenberg
 Andrew I. Rosenblum
 Joshua M. Rosenblum
 Joshua A. Rosenthal
 Richard David Rosenthal
 Daniel Rossetti
 Norman Rossinow
 Nicholas P. Rossomando
 Michael Craig Rothberg
 Donna Marie Rothenberg
 Nick Rowe
 Timothy A. Roy Sr.
 Paul G. Ruback
 Ronald J. Ruben
 Joanne Rubino
 David Michael Ruddle
 Bart Joseph Ruggiere
 Susan Ann Ruggiero
 Adam K. Ruhalter
 Gilbert Ruiz
 Stephen P. Russell
 Steven Harris Russin
 Lt. Michael Thomas Russo Sr.
 Wayne Alan Russo
 Edward Ryan
 John J. Ryan

Jonathan Stephan Ryan
 Matthew Lancelot Ryan
 Tatiana Ryjova
 Christina Sunga Ryook
 Thierry Saada
 Jason E. Sabbag
 Thomas E. Sabella
 Scott Saber
 Joseph Sacerdote
 Francis J. Sadocha
 Jude Elias Safi
 Brock Joel Safronoff
 Edward Saiya
 John Patrick Salamone
 Hernando R. Salas
 Juan Salas
 Esmerlin Salcedo
 John Salvatore Salerno Jr.
 Richard L. Salinardi
 Wayne John Saloman
 Nolbert Salomon
 Catherine Patricia Salter
 Frank Salvaterra
 Paul R. Salvio
 Samuel R. Salvo Jr.
 Carlos Samaniego
 Rena Sam-Dinnoo
 James Kenneth Samuel Jr.
 Michael V. San Phillip
 Sylvia San Pio Resta
 Hugo Sanay-Perafiel
 Alva J. Sanchez
 Erick Sanchez
 Jacquelyn P. Sanchez
 Eric Sand
 Stacey Leigh Sanders
 Herman Sandler
 James Sands Jr.
 Ayleen J. Santiago
 Kirsten Santiago
 Maria Theresa Santillan
 Susan G. Santo
 Christopher Santora
 John Santore
 Mario L. Santoro
 Jorge Octavio Santos Anaya
 Rafael Humberto Santos
 Rufino Conrado F. (Roy) Santos III
 Kalyan K. Sarkar
 Chapelle Sarker
 Paul F. Sarle
 Deepika Kumar Sattaluri
 Gregory Thomas Saucedo
 Susan Sauer
 Anthony Savas
 Vladimir Savinkin
 Jackie Sayegh Duggan
 John Sbarbaro
 Robert L. Scandole Jr.
 Michelle Scarpitta
 Dennis Scauso
 John A. Schardt

John G. Scharf
 Fred Claude Scheffold Jr.
 Angela Susan Scheinberg
 Scott M. Schertzer
 Sean Schielke
 Steven Francis Schlag
 Jon S. Schlissel
 Karen Helene Schmidt
 Ian Schneider
 Thomas G. Schoales
 Marisa Di Nardo Schorpp
 Frank G. Schott
 Gerard P. Schrang
 Jeffrey Schreier
 John T. Schroeder
 Susan Lee Kennedy Schuler
 Edward W. Schunk
 Mark E. Schurmeier
 Clarin Shellie Schwartz
 John Schwartz
 Mark Schwartz
 Adriane Victoria Scibetta
 Raphael Scorca
 Randolph Scott
 Christopher J. Scudder
 Arthur Warren Scullin
 Michael Seaman
 Margaret Seeliger
 Anthony Segarra
 Carlos Segarra
 Jason Sekzer
 Matthew Carmen Sellitto
 Howard Selwyn
 Larry John Senko
 Arturo Angelo Sereno
 Frankie Serrano
 Alena Sesinova
 Adele Sessa
 Sita Nermalla Sewnarine
 Karen Lynn Seymour-Dietrich
 Davis (Deeg) Sezna Jr.
 Thomas Joseph Sgroi
 Jayesh Shah
 Khalid M. Shahid
 Mohammed Shajahan
 Gary Shamay
 Earl Richard Shanahan
 Shiv Shankar
 Neil G. Shastri
 Kathryn Anne Shatzoff
 Barbara A. Shaw
 Jeffrey J. Shaw
 Robert J. Shay Jr.
 Daniel James Shea
 Joseph Patrick Shea
 Linda Sheehan
 Hagay Shefi
 Terrance H. Sheffield
 John Anthony Sherry
 Atsushi Shiratori
 Thomas Shubert
 Mark Shulman

See-Wong Shum
 Allan Schwartzstein
 Johanna Sigmund
 Dianne T. Signer
 Gregory Sikorsky
 Stephen Gerard Siller
 David Silver
 Craig A. Silverstein
 Nasima H. Simjee
 Bruce Edward Simmons
 Arthur Simon
 Kenneth Alan Simon
 Michael John Simon
 Paul Joseph Simon
 Marianne Simone
 Barry Simowitz
 Jeff Simpson
 George V. Sims
 Khamladi K. (Khami) Singh
 Roshan R. (Sean) Singh
 Thomas Sinton III
 Peter A. Siracuse
 Muriel F. Siskopoulos
 Joseph M. Sisolak
 John P. Skala
 Francis J. Skidmore Jr.
 Toyena Corliss Skinner
 Paul A. Skrzypek
 Christopher Paul Slattery
 Vincent R. Slavin
 Robert Sliwak
 Paul K. Sloan
 Stanley S. Smagala Jr.
 Wendy L. Small
 Catherine T. Smith
 Daniel Laurence Smith
 George Eric Smith
 James G. Smith
 Jeffrey Randall Smith
 Joyce Smith
 Karl Trumbull Smith
 Kevin Smith
 Leon Smith Jr.
 Moira Smith
 Rosemary A. Smith
 Sandra Fajardo Smith
 Bonnie S. Smithwick
 Rochelle Monique Snell
 Leonard J. Snyder Jr.
 Astrid Elizabeth Sohan
 Sushil Solanki
 Ruben Solares
 Naomi Leah Solomon
 Daniel W. Song
 Michael C. Sorresse
 Fabian Soto
 Timothy P. Soulas
 Gregory T. Spagnoletti
 Donald F. Spampinato Jr.
 Thomas Sparacio
 John Anthony Spataro
 Robert W. Spear Jr.

Maynard S. Spence Jr.
 George E. Spencer III
 Robert Andrew Spencer
 Mary Rubina Sperando
 Frank J. Spinelli
 William E. Spitz
 Joseph P. Spor
 Klaus Johannes Sprockamp
 Saranya Srinuan
 Fitzroy St. Rose
 Michael F. Stabile
 Lawrence T. Stack
 Capt. Timothy Stackpole
 Richard James Stadelberger
 Eric A. Stahlman
 Gregory M. Stajk
 Alexandru Liviu Stan
 Corina Stan
 Mary D. Stanley
 Joyce Stanton
 Patricia Stanton
 Anthony M. Starita
 Jeffrey Stark
 Derek James Statkevics
 Craig William Staub
 William V. Steckman
 Eric Thomas Steen
 William R. Steiner
 Alexander Robbins Steinman
 Andrew Stergiopoulos
 Andrew Stern
 Martha Stevens
 Michael James Stewart
 Richard H. Stewart Jr.
 Sanford M. Stoller
 Lonny J. Stone
 Jimmy Nevill Storey
 Timothy Stout
 Thomas S. Strada
 James J. Straine Jr.
 Edward W. Straub
 George Strauch Jr.
 Edward T. Strauss
 Steven R. Strauss
 Steven F. Strobert
 Walwyn W. Stuart
 Benjamin Suarez
 David S. Suarez
 Ramon Suarez
 Yoichi Sugiyama
 William Christopher Suga
 Daniel Suhr
 David Marc Sullins
 Lt. Christopher P. Sullivan
 Patrick Sullivan
 Thomas Sullivan
 Hilario Soriano (Larry) Sumaya Jr.
 James Joseph Suozzo
 Colleen Supinski
 Robert Sutcliffe
 Selina Sutter
 Claudia Suzette Sutton

John F. Swaine
 Kristine M. Swearson
 Brian Edward Sweeney
 Kenneth J. Swensen
 Thomas F. Swift
 Derek O. Sword
 Kevin T. Szocik
 Gina Szejnberg
 Norbert P. Szurkowski
 Harry Taback
 Joann Tabeek
 Norma C. Taddei
 Michael Taddonio
 Keiichiro Takahashi
 Keiji Takahashi
 Phyllis Gail Talbot
 Robert R. Talhami
 Sean Patrick Tallon
 Paul Talty
 Maurita Tam
 Rachel Tamares
 Hector Tamayo
 Michael Andrew Tamuccio
 Kenichiro Tanaka
 Rhondelle Cherie Tankard
 Michael Anthony Tanner
 Dennis Gerard Taormina Jr.
 Kenneth Joseph Tarantino
 Allan Tarasiewicz
 Ronald Tartaro
 Darryl Taylor
 Donnie Brooks Taylor
 Loris Ceylon Taylor
 Michael M. Taylor
 Paul A. Tegtmeier
 Yeshavant Moreshwar Tembe
 Anthony Tempesta
 Dorothy Temple
 David Tengelin
 Brian J. Terrenzi
 Lisa Marie Terry
 Goumatie T. Thackurdeen
 Harshad Sham Thatte
 Thomas F. Theurkauf Jr.
 Lesley Thomas-O'Keefe
 Brian T. Thompson
 Clive Thompson
 Glenn Thompson
 Nigel Bruce Thompson
 Perry Anthony Thompson
 Vanavah Alexi Thompson
 Capt. William Harry Thompson
 Eric Raymond Thorpe
 Nichola A. Thorpe
 Sal Tieri Jr.
 John Patrick Tierney
 William R. Tieste
 Kenneth F. Tietjen
 Stephen Edward Tighe
 Scott C. Timmes
 Michael E. Tinley

Jennifer M. Tino
 Robert Frank Tipaldi
 John J. Tipping II
 David Tirado
 Hector Luis Tirado Jr.
 Michelle Titolo
 John J. Tobin
 Richard J. Todisco
 Vladimir Tomasevic
 Stephen K. Tompsett
 Thomas Tong
 Doris Torres
 Luis Eduardo Torres
 Amy E. Toyen
 Christopher M. Traina
 Daniel Patrick Trant
 Abdoul Karim Traore
 Glenn J. Travers
 Walter (Wally) P. Travers Jr.
 Felicia Traylor-Bass
 Lisa L. Trerotola
 Karamo Trerra
 Michael Trinidad
 Francis Joseph Trombino
 Gregory J. Trost
 William Tselepis Jr.
 Zhanetta Tsoy
 Michael Patrick Tucker
 Lance Richard Tumulty
 Ching Ping Tung
 Simon James Turner
 Donald Joseph Tuzio
 Robert T. Twomey
 Jennifer Tzemis
 John G. Ueltzhoeffer
 Tyler V. Ugolyn
 Michael A. Uliano
 Jonathan J. Uman
 Anil Shivhari Umarkar
 Allen V. Upton
 Diane Maria Urban
 John Damien Vaccacio
 Bradley H. Vadas
 William Valcarcel
 Mayra Valdes-Rodriguez
 Felix Antonio Vale
 Ivan Vale
 Benito Valentin
 Santos Valentin Jr.
 Carlton Francis Valvo II
 Erica Van Acker
 Kenneth W. Van Auken
 Richard Bruce Van Hine
 Daniel M. Van Laere
 Edward Raymond Vanacore
 Jon C. Vandevander
 Frederick T. Varacchi
 Gopalakrishnan Varadhan
 David Vargas
 Scott C. Vasel
 Azael Ismael Vasquez

Santos Vasquez
 Arcangel Vazquez
 Peter Anthony Vega
 Sankara S. Velamuri
 Jorge Velazquez
 Lawrence Veling
 Anthony M. Ventura
 David Vera
 Loretta A. Vero
 Christopher Vialonga
 Matthew Gilbert Vianna
 Robert A. Vicario
 Celeste Torres Victoria
 Joanna Vidal
 John T. Vigiano II
 Joseph Vincent Vigiano
 Frank J. Vignola Jr.
 Joseph B. Vilaro
 Sergio Villanueva
 Chantal Vincelli
 Melissa Vincent
 Francine A. Virgilio
 Lawrence Virgilio
 Joseph G. Visciano
 Ramsaroop Vishnu
 Joshua S. Vitale
 Maria Percoco Vola
 Lynette D. Vosges
 Garo H. Voskerijian
 Alfred Vukuosa
 Gregory Wachtler
 Gabriela Waisman
 Courtney Wainsworth Walcott
 Victor Wald
 Benjamin Walker
 Glen J. Wall
 Mitchel Scott Wallace
 Peter G. Wallace
 Lt. Robert F. Wallace
 Roy Wallace
 Jean Marie Wallendorf
 Matthew Blake Wallens
 John Wallace Jr.
 Barbara P. Walsh
 James Walsh
 Jeffrey Patrick Walz
 Ching H. Wang
 Weibin Wang
 Lt. Michael Warchola
 Stephen Gordon Ward
 James A. Waring
 Brian G. Warner
 Derrick Washington
 Charles Waters
 James Thomas (Muddy) Waters Jr.
 Capt. Patrick J. Waters
 Kenneth Watson
 Michael H. Waye
 Todd C. Weaver
 Walter E. Weaver
 Nathaniel Webb

Dinah Webster
 Joanne Flora Weil
 Michael Weinberg
 Steven Weinberg
 Scott Jeffrey Weingard
 Steven Weinstein
 Simon Weiser
 David M. Weiss
 David T. Weiss
 Vincent Michael Wells
 Timothy Matthew Welty
 Christian Hans Rudolf Wemmers
 Ssu-Hui (Vanessa) Wen
 Oleh D. Wengerchuk
 Peter M. West
 Whitfield West
 Meredith Lynn Whalen
 Eugene Whelan
 Adam S. White
 Edward James White
 James Patrick White
 John S. White
 Kenneth W. White
 Leonard Anthony White
 Malissa White
 Wayne White
 Leanne Marie Whiteside
 Mark Whitford
 Michael T. Wholey
 Mary Lenz Wieman
 Jeffrey David Wiener
 William J. Wik
 Allison M. Wildman
 Lt. Glenn Wilkinson
 John C. Willett
 Brian Patrick Williams
 Crossley Williams Jr.
 David Williams
 Deborah Lynn Williams
 Kevin Michael Williams
 Louie Anthony Williams
 Louis Calvin Williams III
 Lt. John Williamson
 Cynthia Wilson
 Donna Wilson
 William E. Wilson
 David H. Winton
 Glenn J. Winuk
 Thomas Francis Wise
 Alan L. Wisniewski
 Frank T. Wisniewski
 David Wiswall
 Sigrid Charlotte Wiswe
 Michael R. Wittenstein
 Christopher W. Wodenshek
 Martin P. Wohlforth
 Katherine S. Wolf
 Jennifer Y. Wong
 Jenny Seu Kueng Low Wong
 Siu Cheung Wong
 Yin Ping (Steven) Wong

Yuk Ping Wong
 Brent James Woodall
 James J. Woods
 Patrick Woods
 Richard Herron Woodwell
 Capt. David Terence Wooley
 John Bentley Works
 Martin Michael Wortley
 Rodney James Wotton
 William Wren
 John Wright
 Neil R. Wright
 Sandra Wright
 Jupiter Yambem
 Suresh Yanamadala
 Matthew David Yarnell
 Myrna Yaskulka
 Shakila Yasmin
 Olabisi L. Yee
 Edward P. York
 Kevin Patrick York
 Raymond York
 Suzanne Youmans
 Barrington L. Young
 Jacqueline (Jakki) Young
 Elkin Yuen
 Joseph Zaccoli
 Adel Agayby Zakhary
 Arkady Zaltsman
 Edwin J. Zambrana Jr.
 Robert Alan Zampieri
 Mark Zangrilli
 Ira Zaslow
 Aurelio Zedillo
 Kenneth Albert Zelman
 Abraham J. Zelmanowitz
 Martin Morales Zempoaltecatl
 Zhe (Zack) Zeng
 Marc Scott Zeplin
 Jie Yao Justin Zhao
 Ivelin Ziminski
 Michael Joseph Zinzi
 Charles A. Zion
 Julie Lynne Zipper
 Salvatore J. Zisa
 Prokopios Paul Zois
 Joseph J. Zuccala
 Andrew Steven Zucker
 Igor Zukelman

American Airlines Flight 11

John Ogonowski
 Thomas McGuinness
 Barbara Arestegui
 Jeffrey Collman
 Sara Low
 Karen Martin
 Kathleen Nicosia
 Betty Ong
 Jean Roger

Dianne Snyder
 Madeline Sweeney
 Anna Williams Allison
 David Angell
 Lynn Angell
 Seima Aoyama
 Myra Aronson
 Christine Barbuto
 Berry Berenson
 Carolyn Beug
 Carol Bouchard
 Robin Caplin
 Neillie Casey
 Jeffrey Coombs
 Tara Creamer
 Thelma Cuccinello
 Patrick Currivan
 Andrew Curry Green
 Brian Dale
 David DiMeglio
 Donald Ditullio
 Albert Dominguez
 Alex Filipov
 Carol Flyzik
 Paul Friedman
 Karleton D.B. Fyfe
 Peter Gay
 Linda George
 Edmund Glazer
 Lisa Fenn Gordenstein
 Paige Farley Hackel
 Peter Hashem
 Robert Hayes
 Ted Hennessy
 John Hofer
 Cora Holland
 Nicholas Humber
 John Jenkins
 Charles Jones
 Robin Kaplan
 Barbara Keating
 David Kovalcin
 Judy Larocque
 Jude Larson
 Natalie Larson
 N. Janis Lasden
 Daniel John Lee
 Daniel C. Lewin
 Susan MacKay
 Chris Mello
 Jeff Mladenik
 Antonio Montoya
 Carlos Montoya
 Laura Lee Morabito
 Mildred Naiman
 Laurie Neira
 Renee Newell
 Jacqueline Norton
 Robert Norton
 Jane Orth
 Thomas Pecorelli

Sonia Morales Puopolo
David Retik
Philip Rosenzweig
Richard Ross
Jessica Sachs
Rahma Salie
Heather Smith
Douglas Stone
Xavier Suarez
Michael Theodoridis
James Trentini
Mary Trentini
Mary Wahlstrom
Kenneth Waldie
John Wenckus
Candace Lee Williams
Christopher Zarba

American Airlines Flight 77

Charles Burlingame
David Charlebois
Michele Heidenberger
Jennifer Lewis
Kenneth Lewis
Renee May
Paul Ambrose
Yeneneh Betru
M.J. Booth
Bernard Brown
Suzanne Calley
William Caswell
Sarah Clark
Asia Cottom
James Debeuneure
Rodney Dickens
Eddie Dillard
Charles Droz
Barbara Edwards
Charles S. Falkenberg
Zoe Falkenberg
Dana Falkenberg
Joe Ferguson
Wilson "Bud" Flagg
Dee Flagg
Richard Gabriel
Ian Gray
Stanley Hall
Bryan Jack
Steven D. "Jake" Jacoby
Ann Judge
Chandler Keller
Yvonne Kennedy
Norma Khan
Karen A. Kincaid
Norma Langsteuerle
Dong Lee
Dora Menchaca
Christopher Newton
Barbara Olson
Ruben Ornedo
Robert Penniger

Lisa Raines
Todd Reuben
John Sammartino
Diane Simmons
George Simmons
Mari-Rae Sopper
Bob Speisman
Hilda Taylor
Leonard Taylor
Leslie A. Whittington
John Yamnicky
Vicki Yancey
Shuyin Yang
Yuguang Zheng

United Airlines Flight 175

Alona Avraham
Garnet "Ace" Bailey
Mark Bavis
Graham Berkeley
Touri Bolourchi
Klaus Bothe
Daniel Brandhorst
David Brandhorst
John Cahill
Christoffer Carstanjen
John Corcoran
Dorothy Dearaujo
Gloria Debarraera
Lisa Frost
Ronald Gamboa
Lynn Goodchild
Rev. Francis E. Grogan
Carl Hammond
Peter Hanson
Susan Hanson
Christine Hanson
Gerald Hardacre
Eric Hartono
James E. Hayden
Herbert Homer
Robert Jalbert
Ralph Kershaw
Heinrich Kimmig
Brian Kinney
Robert LeBlanc
Maclovio "Joe" Lopez Jr.
Marianne MacFarlane
Louis Neil Mariani
Juliana Valentine McCourt
Ruth McCourt
Wolfgang Menzel
Shawn Nassaney
Patrick Quigley
Frederick Rimmele
James M. Roux
Jesus Sanchez
Kathleen Shearer
Robert Shearer
Jane Simpkin
Brian D. Sweeney

Timothy Ward
William Weems

United Airlines Flight 93

Jason Dahl
Leroy Homer
Lorraine Bay
Sandra Bradshaw
Wanda Green
CeeCee Lyles
Deborah Welsh
Christian Adams
Todd Beamer
Alan Beaven
Mark Bingham
Deora Bodley
Marion Britton
Thomas E. Burnett Jr.
William Cashman
Georgine Corrigan
Joseph Deluca
Patrick Driscoll
Edward Felt
Colleen Fraser
Andrew Garcia
Jeremy Glick
Lauren Grandcolas
Donald F. Green
Linda Gronlund
Richard Guadagno
Toshiya Kuge
Waleska Martinez
Nicole Miller
Mark Rothenberg
Christine Snyder
John Talignani
Honor Wainio

Pentagon

Spc. Craig Amundson
Melissa Rose Barnes
Master Sgt. Max Beilke
Kris Romeo Bishundat
Carrie Blagburn
Lt. Col. Canfield D. Boone
Donna Bowen
Allen Boyle
Christopher Lee Burford
Daniel Martin Caballero
Sgt. First Class Jose Calderon
Angelene C. Carter
Sharon Carver
John J. Chada
Rosa Maria (Rosemary) Chapa
Julian Cooper
Lt. Cmdr. Eric Allen Cranford
Ada Davis
Capt. Gerald Francis Deconto
Lt. Col. Jerry Don Dickerson
Johnnie Doctor

Capt. Robert Edward Dolan
 Cmdr. William Howard Donovan
 Cmdr. Patrick S. Dunn
 Edward Thomas Earhart
 Lt. Cmdr. Robert Randolph Elseth
 Jamie Lynn Fallon
 Amelia V. Fields
 Gerald P. Fisher
 Matthew Michael Flocco
 Sandra N. Foster
 Capt. Lawrence Daniel Getzfred
 Cortz Ghee
 Brenda C. Gibson
 Ron Golinski
 Diane M. Hale-McKinzy
 Carolyn B. Halmon
 Sheila Hein
 Ronald John Hemenway
 Maj. Wallace Cole Hogan
 Jimmie Ira Holley
 Angela Houtz
 Brady K. Howell
 Peggie Hurt, Crewe
 Lt. Col. Stephen Neil Hyland
 Robert J. Hymel
 Sgt. Maj. Lacey B. Ivory
 Lt. Col. Dennis M. Johnson
 Judith Jones
 Brenda Kegler
 Lt. Michael Scott Lamana
 David W. Laychak
 Samantha Lightbourn-Allen
 Maj. Steve Long
 James Lynch
 Terrance M. Lynch

Nehamon Lyons
 Shelley A. Marshall
 Teresa Martin
 Ada L. Mason
 Lt. Col. Dean E. Mattson
 Lt. Gen. Timothy J. Maude
 Robert J. Maxwell
 Molly McKenzie
 Patricia E. (Patti) Mickley
 Maj. Ronald D. Milam
 Gerard (Jerry) P. Moran
 Odessa V. Morris
 Brian Anthony Moss
 Ted Moy
 Lt. Cmdr. Patrick Jude Murphy
 Khang Nguyen
 Michael Allen Noeth
 Diana B. Padro
 Spc. Chin Sun Pak
 Lt. Jonas Martin Panik
 Maj. Clifford L. Patterson
 Lt. J.G. Darin Howard Pontell
 Scott Powell
 Capt. Jack Punches
 Joseph John Pycior
 Deborah Ramsaur
 Rhonda Rasmussen
 Marsha Dianah Ratchford
 Martha Reszke
 Cecelia E. Richard
 Edward V. Rowenhorst
 Judy Rowlett
 Robert E. Russell
 William R. Ruth
 Charles E. Sabin

Marjorie C. Salamone
 Lt. Col. David M. Scales
 Cmdr. Robert Allan Schlegel
 Janice Scott
 Michael L. Selves
 Marian Serva
 Cmdr. Dan Frederic Shanower
 Antoinette Sherman
 Don Simmons
 Cheryle D. Sincock
 Gregg Harold Smallwood
 Lt. Col. Gary F. Smith
 Patricia J. Statz
 Edna L. Stephens
 Sgt. Maj. Larry Strickland
 Maj. Kip P. Taylor
 Sandra Taylor
 Karl W. Teepe
 Sgt. Tamara Thurman
 Lt. Cmdr. Otis Vincent Tolbert
 Willie Q. Troy
 Lt. Cmdr. Ronald James Vauk
 Lt. Col. Karen Wagner
 Meta Waller
 Staff Sgt. Maudlyn A. White
 Sandra L. White
 Ernest M. Willcher
 Lt. Cmdr. David Lucian Williams
 Maj. Dwayne Williams
 Marvin Woods
 Kevin Wayne Yokum
 Donald McArthur Young
 Lisa Young
 Edmond Young

Now let's roll!

Acknowledgments

THERE ARE SEVERAL PEOPLE whom I would like to thank for their assistance in writing this book:

Issam Elbaytam of DataDynamics, Inc., for reviewing the chapters on ActiveReports for technical accuracy and completeness. Likewise, Rob Duncan of ComponentOne, Inc., for checking the chapters on VS-View and Preview.

Dan Carr, Aric Rosenbaum, Ryan Follmer, and Chuck Cage for their advice, guidance, and technical assistance on various chapters.

Karen Watterson, my editor at *Hardcore Visual Basic* magazine, who helped develop the initial idea for this book, proofread every chapter, and steered this ship through some very troubled waters.

Sofia Marchant, Laura Cheu, and Nate McFadden, project managers; Laura Cheu and Kari Brooks, production editors; and Ami Knox, copy editor, for their invaluable contributions and hard work (much of it over the Christmas holidays) that drove this project to completion.

My clients, whose many challenges over the years provided the foundation of literally all that is contained within these pages.

My wife, Wendy, for providing me with the love, affection, and support that makes all these efforts worthwhile.

Most important, thanks be to God for the ability to do this kind of intellectually demanding work.

Introduction

REPORT WRITING HAS ALWAYS BEEN a thorn in the side of software developers. Like all other tools for software development, report writing technologies have evolved dramatically over the past several years. When Visual Basic was first released, there were only two viable ways of building reports: 1) Using an interactive report writing tool like Crystal Reports or R&R Report Writer, or 2) hand-coding using the VB Print object. The more adventurous addressed the Windows Printer API directly, calling functions such as OpenPrinter and TextOut. The VB Printer object was (and still is) rather weak, especially in its lack of an event-driven interface, and most developers had neither the time nor the expertise to deal with the API approach. This left interactive report writers as the only viable possibility. In time, many developers became experts in their chosen report writer and, overall, these tools have served their purpose very well.

Times have changed and scores of other tools have emerged into the marketplace. Today, the way I see things, there are three categories of report writing tools:

- The now-classic interactive report writers like Crystal Reports
- Source code-only alternatives like VS-View and Preview, both from ComponentOne, Inc.
- Tools that are a cross between an interactive report writer and source code like ActiveReports from DataDynamics, Inc., and VS-View Reporting Edition from ComponentOne, Inc.

There's also a wide assortment of other not-so-standard report writers that seem to defy categorization. Some even come with source code. Which tool is best is a long-running philosophical discussion among software professionals, and strong opinions vary from developer to developer. I personally prefer the VS-View/Preview approach, whereas many of my colleagues prefer ActiveReports. Both of these products are consistently among the top sellers at VBXtras.com. I also have many experienced colleagues who prefer Crystal Reports. There are even some users of R&R Report Writer (<http://www.livewarepub.com>) out there, although the market has been dominated by Crystal Reports for the past several years. We each have very specific reasons why we have chosen the tools that we use and, to be honest, familiarity has a lot to do with it.

Other developers have their choices and reasons as well. In August 2002, I suggested a survey question to the Webmasters of VBWire.com, a Web site

dedicated to providing updated technical and product information to users of VB and .NET technologies. The question was, “If you had your choice, what tool would you use for report development?” I gave five possible responses: Crystal Reports, ComponentOne’s VS-View/Preview for .NET, Data Dynamics ActiveReports, Actuate, and Other. With 1297 people responding, the response percentage breakdown was as follows:

Crystal Reports	42%
VS-View/Preview for .NET	16%
ActiveReports	20%
Actuate	10%
Other	12%

Since the first word of this book’s title is “Enterprise,” rest assured that I intend to show you how to make reports available to the enterprise by hosting report engines on servers. Because Crystal Decisions has the largest market share of any report development tool, as evidenced by the results of the preceding Web poll, I’ll concentrate on the Crystal Enterprise technology as an example of enterprise-wide report distribution. Nevertheless, I’ll also discuss the advantages of creating your own report server (it’s not difficult) using tools such as ActiveReports and VS-View/Preview. There are certainly other alternatives to these approaches such as Actuate, Cognos, Business Objects, and WebFocus, but detailed coverage of these tools is beyond the scope of this book.

Reporting is as much a philosophy as a technology. It’s fundamentally an issue of getting the right information (not too much and not too little) to the right people quickly and efficiently. There are a myriad of ways to accomplish this: e-mail; Web availability; output format options such as PDE, HTML, Excel, RTE, or Word; options of interactive reports that allow drilldown to subreports or even the raw database information itself; and graphing. Of course, paper printouts will be with us forever. It’s been said that the paperless office is about as likely as the paperless bathroom.

In 1995, I was at a technology conference where the keynote speaker was an expert in virtual reality. He spoke of a future day where users could don virtual reality goggles and view their data in a virtual world where data would be plotted and graphed in three dimensions or even one where an artificially intelligent virtual person would respond to natural language questions as to what the data meant. While such *Star Trek* scenarios are certainly far-fetched, it shows the extent to which people are thinking about meeting reporting requirements.

While there are certainly differences in technology for report delivery, there are also differences in methodology as well. One is just as important as the other. By “methodology,” I refer to the processes and procedures of building a report, designing a criteria screen, and deploying it to the user. It is the rule, not the exception, at most companies I’ve worked with that developers often reinvent the wheel every time a simple report is needed. It often takes days and weeks to deliver a report that should be done in a few hours. Often, no one knows what version of which reporting tools are on what workstations, where to deploy the report, and who has the documentation. Like any other aspect of software development, these problems need to be addressed, or every new report a client requests becomes a project unto itself.

The idea for this book grew out of an e-mail I sent to my long-time *Visual Basic Developer* (now *Hardcore Visual Basic*) newsletter editor at Pinnacle Publishing, Karen Watterson, way back in February 2002. After suggesting an article idea for the Crystal Report Creation API, she suggested that the advanced developer’s features of Crystal would make a good book topic. I thought that this topic had been exhaustively covered by other authors and that I couldn’t add much to the existing field of knowledge. I thought, however, that a book on other reporting tools such as VS-View and ActiveReports and the entire range of report-related technologies would be appropriate. In fact, after researching the market, I couldn’t find another book that had ever been written specifically on the subject of report writing. I found this to be very strange, as report writing is such a vital part of application development.

My goal in this book is to discuss report writing from a developer’s perspective. I plan to discuss the programming of reports using such tools as VS-View / Preview and ActiveReports, as well as the programmatic interface offered by Crystal Reports, and even delivery of reports to handheld wireless devices. In addition, I’ll cover how to design reports and what items to consider when creating a specification document. Then, I’ll discuss the SQL and ADO/ADO.NET issues you’ll need to understand to extract the data necessary for the reports you are building. From there, I’ll show you how to create effective and easy-to-maintain criteria screens. You’ll learn about the role played by the Microsoft Office XP suite. Since reports will often be exported to both Excel and Word, as well as transmitted throughout the enterprise by Outlook, we’ll explore these technologies in depth together. Since both Lotus Notes and Adobe Acrobat also play an important role in the creation and dissemination of reports, I’ll explain the parts they can play as well. Then, you’ll learn how to deliver reports over the Internet using both ASP and ASP.NET, paying careful attention to the role played by XML Web services. Finally, I’ll conclude by showing you the new Palm and Windows CE technologies for Pocket PCs and remote wireless connections.

This book isn’t intended either as an endorsement or a manual replacement for any particular product. For those reporting products covered, it’s not the goal to exhaustively explain every property, method, and event. If you are already

a user of these products, you will find in these pages much helpful information on how to use these products to their fullest potential. For those of you new to report development, this book will help you decide which tools and methodologies are right for you. My goal is to focus on the programming necessary to use these tools to develop “real-world” reports and to integrate these reports into your applications. All of the techniques that I describe—and most of the code examples that I use (with the exception of some of the .NET examples, as this technology is so new)—are taken from production applications that I have delivered to paying customers over the past few years.

All in all, I hope this book provides you with some fresh (or forgotten) ideas about delivering reports. Enjoy, and let me know what you think.

Carl Ganz, Jr.
seton.software@verizon.net
Raritan, New Jersey

CHAPTER 1

Reporting in a Nutshell

REPORT WRITING HAS EVOLVED over the years as radically as the tools for software development itself. Those of us who are a little older remember the days when a central computer system would produce the formerly ubiquitous “green-bar” reports. Large, continuous-feed data outputs were distributed by hand throughout the organization by a clerk who carried these monstrosities to individual managers. Mercifully, technology has evolved beyond all that so that now the same report can be served up automatically, usually by e-mail or even wireless transmission to a personal digital assistant (PDA). Moreover, the trend is toward better “just in time” information (often in the form of exception or summary reports instead of comprehensive ones) so that only those individuals who require certain data receive it and those individuals can get timely “bites” of data instead of only large monthly or yearly reports.

Because information technology has evolved so rapidly over the past few years, the definition of what constitutes a report has undergone a dramatic transformation. Traditionally, reports were only thought of as something that printed on paper. This definition has since become blurred as there are multiple ways information can be disseminated throughout the enterprise. Today, paper reports are largely used only as working copies to be carried to meetings or as written notes or archives. Given the use of Web technology, e-mail, PDAs, and Adobe Acrobat PDF files, paper has—mercifully for the environment—fallen to a tertiary position as a means of conveying information.

Report development is often one of the last processes in developing an application when, practically speaking, it should be one of the first steps when performing a system design. By starting with the reports and other data outputs that are required, you can better determine what the inputs should be. In fact, when all is said and done, if a data element that is used in the application is not found on any of the reports, the need for that data element should be questioned.

Certain standards govern the format of reports. Text and date information, for example, should be left justified in their respective columns along with their column titles. Numeric amounts and their column titles, however, should be right justified so that decimal points and digits line up. Margins can be adjusted

as necessary given the amount of data you intend to print on a page, but remember that users may want to hold printed output in a binder, so take this into consideration when sizing margins.

To make sure that no information is lost, it is judicious to evaluate whether the page numbers should read “Page x of y”. Also, the phrase “End of Report” should appear after the last row of data on the last page. For reports that contain sensitive data, it is often a good practice to include a phrase on each page footer to this effect: “The information contained in this report is internal corporate information only and should not be distributed outside of the organization.” Highly sensitive reports can be printed with the label “Copy x of y” so as to account for all printed copies. Moreover, special paper can be used that will preclude photocopying the printed documents.

As a rule, users should be provided with the option to print a criteria page at the beginning of each report that indicates the criteria used to filter the data contained within it. If possible, these criteria can also appear on the first page of the report before the data itself.

Report distribution has made huge leaps since the introduction of the Internet and corporate intranets. Since many reports are built into applications (compiled EXEs), a user would normally need a copy of that application installed on his or her desktop in order to access the report. Now, the reporting functionality can be completely Web-based. Using Web-based technology, the comparatively finite number of desktop users can still have access to report functionality, while the often much larger number of Web users can access a Web-based application that will provide them with report criteria screens to allow them to run and export reports.

Security

Of course, all these means of disseminating information bring with them numerous security issues. While a comprehensive discussion of computer security is beyond the scope of this book, a brief mention of report-and document-related security issues is appropriate. There are different levels of security related to report information. It could be simply that the ability to print certain reports is available only to specified users. This fails, of course, when one of these users sends a report to a shared printer to which anyone on the floor has access. I once had a user print a list of salary and bonus information that was fortunately found by the human resources director before any damage was done. It was the last time that user ever made that mistake. It is difficult to employ any kind of security measures on a computer system without incurring significant expense. All it takes is one user to write their password on their keyboard and the most elaborate security system is immediately compromised. One way to track who is being careless is to create a log entry in an audit trail table every time a report is run.

You can record what report was run, the criteria, at what date and time, by whom, and on what machine. You could also print the ID of the user who ran the report on all output so that when the salary report is carelessly left on a table in the lunchroom you'll know who to blame.

Another form of data access restriction is to allow multiple users permission to run the same report but restrict the set of criteria. Thus, one user could run a compensation report for Departments A, B, or C, whereas another user might only be able to run it for Department B. Optionally, any user could be allowed to run the report, but the Compensation column could be suppressed for those users who don't have authorization to view this information.

Some of the technology for securing documents lies in the forms upon which they are printed. Checks are a common example. Most checks have numerous security devices to deter fraud. First, they can be printed on paper that has various color tones throughout the document as well as a distinctive watermark to prevent photocopying. Then, the check amount is printed in several locations on the check itself. I've even seen checks that have heat-sensitive logos on the reverse side that will disappear for a few seconds when heat, say, from your thumb, is applied to them. Taken together, these security devices may not completely prevent fraud, but they'll at least make it very difficult for the culprits and show that you've done due diligence.

Magnetic ink character recognition (MICR) allows you to print the entire check—logo, check and account numbers, signature, etc.—directly on blank paper rather than maintain preprinted check stock, which is easier to steal. In this way there is no need to constantly void preprinted checks that are destroyed in printing.

Security threads are polyester or plastic bands embedded into paper just beneath the surface. The new U.S. currency employs this device as an anticounterfeiting measure. Security threads restrict visibility in reflected light while permitting visibility in transmitted light. They offer protection against photocopying, as copiers see documents only in reflected light. Also, the presence of threads in a document provides for easy authentication. You can obtain more information on the different products and techniques for document security from your forms manufacturer.

Aesthetics

Effective report presentation requires also that you consider your audience's background. Many of my clients are investment banking and pharmaceutical companies. While there is certainly a remarkable difference in the corporate cultures between the two industries, there is also a vast difference in the average age of the staff. The majority of the users at the investment banking firms are under 35, whereas the opposite is true of the pharmaceutical clients. This age difference

manifests itself in the way reports are produced. Younger people can generally see reports printed in a smaller font and in fact often prefer it as there is more information printed on one page. Older people have a much harder time viewing this information, and the font size for your reports needs to reflect this.

Font size can also come into play when there is a significant need to conserve paper. I have a client who is a reseller of telecommunication service. His company works on a multilevel marketing model. A person becomes a dealer in the organization and recruits other people as dealers, who in turn recruit others, and so on. Dealers receive commissions from their sales as well as the sales of all the dealers in their sales organization. Because telecommunication sales is such a high-volume, low-margin industry, cost efficiency is a far more sensitive issue than it is in many other industries, and this sensitivity affects reporting. Each month, commission reports need to be mailed to individual dealers, along with a statement of which dealers in the downline produced what sales. Since some of these commission reports run to several pages, and anything more than four $8\frac{1}{2} \times 11$ sheets in an envelope will push the letter into the next postage bracket, it behooves the client to cram as much information as possible onto one sheet of paper. The result is a commission report that uses a 6-point Arial font with a line spacing of .75, meaning that the space between printed lines is 75 percent of the spacing required by a printed line. The result looks something like this:

Name	Sales	Comm.	Bonus	Total
John Smith	100.00	10.00	4.00	14.00
Jane Jones	200.00	20.00	8.00	28.00

Naturally, this is not an easy read without the use of a ruler and a magnifying glass. But, since the reports were printed duplex (note that not all printers support duplexing), that is, printed on both sides of the paper, a lot of paper was saved and only rarely did the letter get pushed into the next postage level. Most importantly, the client was happy.

Such exacting requirements for report presentation are normally not an overriding issue for most business reports. Presenting data in a clear and organized way, usually some form of a table structure, is all that is required (although I do have clients who have an official font that is used for all their reports, documents, and correspondence so as to create a more uniform look for the firm as a whole). Be careful about using too many different fonts in a report, as this could cause memory overflow errors on older printers (of course, so could too many graphics). Variations in the bold and size attributes of the same font are most

appropriate to highlight important areas of the report. The right font can make all the difference in building an effective report presentation. Font selection can be so important that many books have a paragraph in the front matter describing the font used to print the pages within. Serif fonts are the most popular fonts to use for printed reports, but sans serif fonts such as Arial are preferred for screen viewing. Serif fonts have small lines at the top and bottom of the characters that research has proven makes text easier to read. Sans serif fonts do not have these lines (“sans” is simply French for “without”). Take a look at these examples:

This is a serif font.

This is a sans serif font.

Examine your favorite books, magazines, and newspapers, and you’ll see that as a rule they use serif fonts. When viewing reports on a computer screen, however, studies have shown that sans serif fonts are easier to read than serif fonts. Because Arial is a sans serif font, it is often used for screen displays. Since most reports are viewed on screen and not printed, Arial may be your best bet for font selection.

You can make the layout easier to read by shading alternate rows of data on reports, especially those that print landscape, and most especially those that print landscape on legal-size paper. Though alternating shading is especially good when reading rows of figures and distinguishing between lines with similar kinds of data, consider that the report may be put through a fax machine. If this is the case, you may need to rethink shading, or at least use a very light shade, as shaded text often can’t be read on a fax. When you design a report to print for legal-size paper, you need to consider that the user may or may not have an ample supply of legal-size paper available. While legal-size paper can typically be fed into a printer via the manual feed, this method usually only allows a small number of sheets at a time. If you expect the report to print a large number of pages, recommend that the client obtain a legal-size paper bin. Also, before printing the report, display a message box reminding the user that legal-size paper is required in order for the report to print.

Some reports require a far greater level of fine-tuning. I have a client who develops financial sales software that produces printed sales presentations. The reports for this project were the most complex and involved of any I have ever done. There are a number of forces at play here. First, each phrase, word, and even punctuation mark had to be carefully crafted by the legal department in order to meet regulatory compliance requirements. Then, the marketing department had to be satisfied that it was an effective sales tool. Finally, I had the issue of making sure that the reports were simple to understand for both the financial clients as well as the sales reps because as my client politely tells me, “Carl, they’re idiots.”

International Considerations

If you plan to deliver your applications outside the United States, there is one very important issue you must consider. The United States is one of the few countries that uses letter-size paper (8½×11). Almost everyone else uses A4 paper, which is a bit longer and a bit narrower than letter-size, specifically 8.27×11.69 inches. (The staff at my client's European offices are only mildly amused when I refer to "regular" paper and "foreign" paper.) If you don't take this width difference into consideration, then your data will print off the right side of the page.

You can determine the paper size setting of the currently selected printer via the Visual Basic Printer object. Simply querying the `PaperSize` property as follows

```
iPaperSize = Printer.PaperSize
```

will return a constant value indicating the paper size setting for the currently selected printer. You can find a list of all the different `PaperSize` settings in the Visual Basic documentation.

The Windows Regional Settings, known as Regional Options in Windows 2000 and later, are important for determining the formatting of dates, times, decimals, currency, days of the week, and months of the year. Dates are probably the greatest area of confusion. Many countries use the dd/mm/yyyy format, while the United States uses the mm/dd/yyyy style. In China and some Asian countries, dates appear as yyyy/mm/dd. Therefore, if a date on a report reads 04/01/02, you cannot be certain if it is referring to January 4, 2002, or April 1, 2002. To eliminate all confusion without consuming much extra space, I usually write the date as 04-Jan-2002 on all reports that are used internationally.

Any of the Windows Regional Settings are only an API call away. The `GetLocaleInfo` API function, shown in Listing 1-1, receives a hexadecimal value as a parameter. This value equates to the setting you wish to retrieve.

Listing 1-1. *GetLocaleInfo* API Syntax

```
Function LocaleInfo(lDataNeeded As Long) As String
    Dim cBuffer As String
    Dim lResult As Long
    Dim iBuffer As Integer

    iBuffer = 255

    cBuffer = String$(iBuffer - 1, 0)

    lResult = GetLocaleInfo(LOCALE_USER_DEFAULT, lDataNeeded, _
        cBuffer, iBuffer)
```

```

    If lResult <> 0 Then
        LocaleInfo = Left$(cBuffer, lResult - 1)
    End If

End Function

```

The book's downloadable source code, which is available at the Apress Web site (<http://www.apress.com>), has a list of the Regional Settings values expressed as an enumerator. The example shown in Listing 1-2 illustrates what some of the values are.

Listing 1-2. Some of the Valuable Data Returned by GetLocaleInfo

```

Dim cSettings As String

cSettings = "Abbrev. Country: " & _
    LocaleInfo(Locale.AbbrevCountry) & vbCrLf

cSettings = cSettings & "Country: " & _
    LocaleInfo(Locale.CountryEnglish) & vbCrLf

cSettings = cSettings & "Currency Decimal Separator: " & _
    LocaleInfo(Locale.CurrDecimalSep) & vbCrLf

cSettings = cSettings & "Language: " & _
    LocaleInfo(Locale.Language) & vbCrLf

cSettings = cSettings & "Currency Symbol: " & _
    LocaleInfo(Locale.IntlCurrencySymbol) & vbCrLf

cSettings = cSettings & "Long Date: " & _
    LocaleInfo(Locale.LongDateFormat) & vbCrLf

cSettings = cSettings & "Short Date: " & _
    LocaleInfo(Locale.ShortDateFormat) & vbCrLf

cSettings = cSettings & "Time Format: " & _
    LocaleInfo(Locale.TimeFormat) & vbCrLf

cSettings = cSettings & "First Day of week: " & _
    LocaleInfo(Locale.DayName1)

MsgBox cSettings

```

This code produces the message box depicted in Figure 1-1.



Figure 1-1. Regional Settings—United States

If you open the Regional Settings dialog box under the Control Panel and change the settings to Germany, you'll see the message box shown in Figure 1-2.



Figure 1-2. Regional Settings—Germany

Of course, you are in no way bound to use the regional settings. Most applications—both in-house and off-the-shelf—have (or at least should have) a security module that manages the names of authorized users and their access levels. This same module can also assign a regional setting as well. The regional setting can refer to a collection of predefined settings—either user-defined or hard-coded—that specify the date format, currency format, etc., regardless of the regional settings specified through the Control Panel. However, if your New York user logs on to a workstation during his trip to the London office, he'll get an

“Insert Letter Size” printer error when he tries to print a report to a printer that is expecting A4.

Report Design

The design stage of any application is the most crucial part of the software development process. My experience has been that almost all projects that go over budget are the result of poor planning, or worse, the complete absence of it. I have had several clients give me a rough idea of their projects and then tell me to begin programming. I would sit at a desk next to a client and work. During the workday the client would tell me to add this or that feature as often as he or she had new and sudden insights about the application. As a junior programmer, I accepted this from clients. As an experienced professional, I no longer tolerate it, although I still see this practice throughout the corporate world. (Note to my clients reading this book: You know if you’re a past offender, so take time out now to feel guilty and then continue reading.)

Creating a Report Specification

The principles discussed here for report design apply as well to the remainder of your application. Screens, logic and workflow, business rules, and database design all need to be prototyped and documented so that the client and the developers understand the mission and objective. Since this book focuses on reports, that is what this design section will focus on.

Report design is often a balancing act of having either too much or not enough information. You have only so much room on a page and a limited amount of time to read it. Therefore, you want to display no less, but no more, than is necessary. First, you’ll need to specify the objective of the report. Is it primarily a summary or a detail? Then determine what columns from what tables will provide the data. This type of design needs to be done working closely with the client. My experience has been that clients have a better understanding of the reports they want from the system than they do of any other feature of the application. Once the purpose and fields have been determined, you can use a tool like Microsoft Word or Excel to lay out the structure of the report. (I personally find Excel easier to work with.) Figure 1-3 illustrates an example of what this layout may look like, using the same fonts and attribute settings that will appear in the final product.

Figure 1-3. Report layout

Sales by Group Report

GROUP	PRODUCT	ON HAND	QTY SOLD	SALE AMOUNT
Group 1	Product 1	4	6	300
	Product 2	3	4	500
	Product 3	6	2	200
<i>Group 1 Totals</i>		<i>13</i>	<i>12</i>	<i>1000</i>
Group 2	Product 5	7	9	600
	Product 6	7	4	800
	Product 8	11	5	500
<i>Group 2 Totals</i>		<i>25</i>	<i>18</i>	<i>1900</i>
Grand Totals		38	30	2900

This layout takes about 5 minutes to create and clearly illustrates to the client exactly how the report will appear. Populating it with sample data is a helpful technique and is better than simply listing the fields or a straight description of the layout. Use paper of the same size as is intended for the final report, even if this means attaching legal-size paper to your specification document. Try to take a what-you-see-is-what-you-get (WYSIWYG) approach and keep all the fonts and font attributes the same as in the final output. Don't make clients use their imagination.

Anticipate client needs by suggesting summary levels that they may not be thinking about. Do they require averages as well as subtotals? Would the report be too difficult to read if there were too many subtotal groupings? Do they want certain parts boldfaced, italicized, or underlined? Are graphs needed? I once used a strikethrough attribute on an employee recruitment report so the client could easily see cancelled interviews. Mention *drilldowns* to clients, that is, paths to get from summary information to detail information. This can occur by having "interactive" reports on a Web page that allow you to click a summarized figure or a bar on a graph to open another report that breaks down detail. These are very intuitive to managers and often elicit "oohs" and "aahs."

The next step in the design process is to create a list of the criteria for the report. I generally recommend being generous in this area as you can't really have

too many criteria unless the users would literally be confused by the sheer number of them. For each criteria you'll need to know if the user can select one or many options, a date range, yes/no options, and different sorting options. Also, you'll need to indicate if certain criteria are mandatory in order to run the report. For example, the criteria description of the Sales by Group Report shown in Figure 1-3 may be

- Sale date from-to range (mandatory)
- Group (one or multiple)
- Product (one or multiple)
- Include discontinued products? Yes/No
- Sort options: On hand, Quantity Sold, Sale Amount

Generally, date criteria should be expressed as a range. If the user only needs one day's worth of information, the "from" and "to" dates are set to the same value. The option of selecting one or multiple criteria, as in the case of the group or product, is expressed in the user interface as a combo box or a multiselect list box, respectively. Finally, the Yes/No options, such as whether or not to include discontinued products in the sales summary, can be expressed with a check box. Sort options belong in a combo box as there is usually only one sort option per report, unless you really need to allow primary, secondary, or even tertiary sorts. When multiple sort options are necessary, you may wish to consider adding Ascending/Descending options next to each sort selection. Often what the client thinks of as a distinct report is simply the same report sorted a different way. Chapter 3 completely explains the technical implementation of these criteria screens.

Report headers are another design element the client needs to approve. Generally, headers will display the name of the company (and, optionally, the company logo), the date and time the report is run, and the page number. Normally, the title of the report is displayed in a larger font in the center. You may wish to display the name of the user who ran the report or even a disclaimer stating that the material included within the report is confidential. Report headers should be consistent across all reports in an application. How critical it is to agree upon report headers at the beginning of the process depends in large part on the report development tool you are using. Crystal Reports, for example, has no easy way of centralizing headers in one location such that a change in one is reflected in all reports. If you are using VS-View or Preview for .NET, report headers can be centralized in one function call that will enable you to change them as needed.

Make sure the report specs are made available to everyone who could possibly have a comment on their final appearance and data composition. Any changes can be discussed at meetings without you, the developer, present. Let the clients fight it out amongst themselves. Doing so will keep you largely insulated from the often excruciating debates as to how data should be organized and presented. In addition, by involving users and management at all levels who wish to participate, no one can truthfully say “I was never consulted” when they end up with a product that isn’t exactly what they want. A technically savvy product or project manager, if not the developer, should be at meetings to handle immediate questions about the technical feasibility of including certain data items and explaining and clarifying often complex relationships between data items. Failing to capture these requirements early on can cause distorted user expectations and ill will between development teams and customers.

Generally, tables that support the various data entry screens in the application need some facility to print out their contents. Since many of these tables consist of simply a primary key value and a verbal description, a generic print routine is easy to create. Usually these dictionary prints don’t even warrant the entry of filter criteria. Other dictionaries are either more complicated and require customization or have a rather large number of records, at which point a criteria screen may be appropriate. These criteria should be discussed with the client during the design stage.

Report aesthetics are also an important topic for discussion. Are there times when color would be appropriate in the report? If so, there are two things to consider. First, color printers are not yet ubiquitous and you cannot depend on one always being available. PDF and Excel files, however, handle color easily, and if your report will largely be disseminated in one of these formats, you are in good shape. The second issue is that of color blindness. About eight percent of men and one half of one percent of women have some type of color-deficient vision. The genes that affect color deficiency belong to the X chromosome, hence the preponderance of male color blindness. Therefore, that sharp-looking grand total of red letters on a green background may be completely invisible to some of your users. For a complete explanation of the various issues regarding color deficiency, see the article “Can Color-Blind Users See Your Site?” at <http://msdn.microsoft.com>.

Export Options

Export options are another point to be decided upon. Normally, reports should print directly to the screen, that is, in “Print Preview,” and from there the client has the option to send the data to the printer or export the data to Excel, ASCII, HTML, or Adobe Acrobat. You could also offer the option of exporting to an Access database. Find out if there are any special report export requirements.

Of course, the report itself could be entirely an export process. Several of my clients have asked me for reports that present a criteria screen and then simply export the results to Excel. They have no interest at all in printed output.

Preprinted Forms

Oftentimes you may need to print a report on a preprinted form, like an IRS 1040 or a W-2. If this is the case, you should examine whether the application really needs to print specific pieces of data at specific locations on the preprinted page, or simply reprint the entire form itself on blank paper. I have a client who was once spending \$7,000 per year on preprinted forms. When I showed him that the same result could be achieved if he performed a mail-merge with a document composed in Microsoft Word, he was naturally elated at the annual savings. Moreover, he now has the flexibility of being able to change the document at will.

High-Volume Printing

High-volume printing raises issues that must be examined for cost efficiency. I have a client who is a New Jersey councilman who printed his constituent reports on an ink-jet printer. Ink-jet printers are relatively cheap, and a decent one can be purchased for about \$100. The hidden costs here are the ink cartridges. With cartridges costing about \$40 each, you don't want to do high-volume printing on an ink-jet printer. In fact, ink-jet printers are loss leaders for the printer industry, as the real profits are in the replacement ink cartridges. Since they are used up at a much faster rate than laser toner cartridges that cost twice as much, you'll end up spending more on ink-jet replacements than you will on toner. There are companies that also sell recycled toner cartridges at a sizable discount compared to new cartridges. In addition to this, ink-jet printers operate at only a fraction of the speed of laser printers. When my client indicated he wanted to print an annual newsletter to send to his 5,000 constituents, I recommended a laser printer. He now prints the text of the newsletter and merges the addresses as well.

Mass mailing can be a science unto itself. If your client needs do customized high-volume mailing pieces—for example, a monthly telephone bill as opposed to a supermarket circular where every recipient receives the same one—you may wish to examine an automated mailing solution. I have another long distance reseller client who sent thousands of telephone bills every month. The billing software creates print images of the bills and sends them to a Pitney Bowes machine that prints the bill, folds it, places it into a postage-paid window envelope, and seals it. Machines such as those sold by Pitney-Bowes are designed specifically for this type of high-volume mailing, and the staff are experts on how

to sort and organize the letters to achieve the maximum bulk rate postage. If you have a requirement for customized high-volume mailing, examine the product solutions at <http://www.pb.com>.

If your volume of mail is so great that it cannot be realistically done in house, consider the services of a bulk mailing company. These firms have the computers and printing equipment to print millions of documents and mail them within a few days. Mailing firms are large, high-volume facilities, some of which print and mail several hundred million documents per year. You can use your software to produce print images according to specifications given to you by the mailing company and then e-mail the data to their facility. Optionally, you can simply give them the raw data, and they will create the print routines for you. Depending on cost, you can work out with them where your work will leave off and theirs will begin. Because it doesn't matter where the mailing company is located, you can contract with virtually any one in the country to obtain the most reasonable rates. Consider this option carefully—you could very easily become overwhelmed with printing and mailing tasks in a high-volume environment.

External Data

You'll need to make sure you can access all the data necessary for your report. A client may want to display sales figures by zip code and then match the zip code to a sales rep roster that you are not maintaining in your application's database. You then need to contact the folks who are the keepers of the sales rep roster and see about joining your tables with theirs or possibly inquire about an export from their system and an import into yours. Be careful here. The machinations you may need to undertake to satisfy a client's seemingly simple request to display sales rep names via a zip code join could add a day or two to the project. Also, going forward you are at the mercy of the owners of the source system. They may change their data structures without warning you, and you'll then need to scramble to adjust your applications to handle the change. I have had this happen to me on several occasions.

Legal Issues

One often overlooked area of report design is the legal implications of system output. Usually, data that is intended for internal corporate use is not an issue. Output that is intended for use external to the organization can often bring with it significant legal liability. As a rule, every report, certificate, fax, statement, or letter that is intended for use outside the organization should be passed by legal counsel for approval. Seemingly innocuous documents may have enormous legal ramifications, and these ramifications may be different from industry to industry.

For example, one of the first systems I ever built was a target market mailing system for the sales agents of a leading U.S. insurance company. A sales agent would buy a list of names, and my system would merge these names with a marketing letter. As I made the system more flexible, I allowed the users to create their own letters. They gladly did so without ever consulting with in-house legal counsel. There were no safeguards in place preventing an agent from sending out a letter promising, say, a guaranteed 20 percent return on a particular product. In the past, courts have ruled that such statements are binding on the company who issued them.

Documents as simple as account statements or even invoices can be potential traps for legal liability. Alert counsel to the format of these documents and exactly what information they contain. Counsel may create a disclaimer that accompanies the text of the document as a safeguard. Even these disclaimers have potential pitfalls, as some states do not recognize this proverbial “fine print” if the print is, literally, too fine. This means by law that if the font is too small, the courts will disregard the existence of the text as having been too small for someone to reasonably read.

Copyright is also a property right that must be guarded. The summarization of even publicly available data has long been held to be copyrightable. Therefore, a company like Dun & Bradstreet, which compiles business information on millions of business entities worldwide, has an intellectual property interest in the data it has collected and in the unique way it presents it. Therefore, it is necessary for any reports that may present this data to individuals outside the organization to affix a copyright notice declaring the information in the report to be proprietary. Absence of a copyright notice can make prosecuting a case for infringement difficult to impossible, as it is incumbent on the copyright owner to make a clear and visible declaration of ownership.

A good rule of thumb is to contact corporate counsel before distributing any information to the outside. The attorneys (and your client) will be impressed by your foresight on these legal issues and will appreciate the fact that you consulted them.

Availability and Distribution

The final design issue is to determine who needs to run the reports. Traditionally there is a Report option on the main menu of desktop-based applications from which criteria screens are launched and reports printed, displayed, and exported. While there may be only 20 users of your application, there may be 100 users of the reports. This is where hybrid application development comes into play. The past few years have seen an explosion in the development of applications for the Web, and the future will offer more opportunities as ASP.NET takes root. Therefore, it may make sense to select some or all of the reports that are needed by

users who are not users of the application itself and create them as Web reports. Chapter 9 explains this process in more detail.

The Web is no longer the only way to make reports available to the masses. As PDAs become more prevalent, more users will want to access their data remotely via a wireless connection to the server. Due to the current state of PDA and wireless technology, you'll need to deal with a number of limitations when allowing reports to be transmitted to a PDA. Because of the slow connection speed, you'll need to limit the amount of data you can transmit between the server and the PDA. Note that this speed problem occurs with wireless modems. People using PDAs with wireless LAN cards enjoy speeds above 10 mbps. This will affect the way you design your reports, especially the HTML exports that PDA devices often use. Chapters 10 and 11 explain these concerns in more detail.

In many instances, users are more interested in receiving reports on a regular basis than they are in running them individually. This is known as the “push” versus “pull” approach. One of my clients has a personnel headcount report that lists the incoming, outgoing, and current employees and temps working in their respective groups. The managing director calls this the “Warm Cushion” report, as it tracks the number of warm cushions, or occupied seats, in the organization. The definitions of these groups are maintained in an organizational hierarchy table. Each Friday, an unattended process is run that loops through the names of each manager, determines what departments ultimately report to him or her, and then produces a report for those departments as a PDF file that is then automatically e-mailed to the manager for review. Chapter 7 explains how to use the VBA interface of such e-mail packages as Outlook and Lotus Notes to send these files.

Report Servers

Report servers are machines and software dedicated to the purpose of running reports. The decision as to whether or not you'll need a report server is the same as whether or not you'll need a fax server. If your automated reporting requirements are so great that they would interfere with an individual workstation user's productivity, then a dedicated machine needs to be considered.



NOTE See Chapter 9 for a discussion of using Crystal Reports with a report server.

We'll take a look at a report server developed by AR Consulting, Inc. (<http://www.arconsultinginc.com/rptsrvr>) to explain how a report server operates. A workstation connects to an ASP page on a Web server and indicates what report should be run and with what criteria. An example of this criteria screen is shown in Figure 1-4.

CP02 Criteria Page - Microsoft Internet Explorer

File Edit View Favorites Tools Help Links »

Back Forward Stop Home Search Favorites History Print Copy Paste

Address http://localhost/eos/cp02_criteria.asp

AR CONSULTING INC
A Computer Consulting Firm

[Setup](#)
[Logout](#)

Home WIP CP Ship **Reports**

Reports | My Reports

CP02 Report Criteria - Critical Path Overview

Report Parameters

Region: ---Select Region---

Vendor: ---Select Vendor---

Style:

Required tasks only: ☒

Active critical paths only: ☒

Report description: CP02_20020526_2142

Publish?: ☐

Save?: ☐

Expiration period: days

Done Local intranet

Figure 1-4. Criteria ASP page

This information is then appended to a table in the application's database located on a report server machine. It is this database that serves as the report queue. A report server-based ActiveX EXE continually monitors this queue and runs the requested report.

Report servers are often used to store a queue of those reports that need to run on a periodic basis. For example, a user may wish to request that the Sales by Product report be run every Friday at 3:00 p.m. and contain the previous week's sales data for a particular department. The report server will record the preferred method of delivery of this report—printed to a specified printer, PDF dump to a particular subdirectory, Excel spreadsheet e-mailed to a specified e-mail address, or published on the server in a variety of formats. At the specified time and date, the server will produce the report automatically and deliver it as requested, up through the expiration date of the report.

Most users request that the report, which can consist of a PDF, Excel, Word, or PowerPoint file, be stored on the server for later retrieval (see Figure 1-5).

Admin - Reports Menu - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites History Print

Address <http://localhost/eos/myreports.asp>

AR CONSULTING INC.
A Computer Consulting Firm

[Setup](#)
[Logout](#)

Home WIP CP Ship **Reports**

Reports | My Reports

My Reports

Description	Status	Submitted	Expiration	
PR02 20020523 2102	F	5/23/02 9:03 PM	5/23/02 10:03 PM	Delete
CP02 20020523 2056	F	5/23/02 8:56 PM	5/23/02 9:56 PM	Delete
Summary perf. by div.	F	5/17/02 0:00 AM	5/16/02 0:00 AM	Delete
Vendor summary perf. by div.	F	5/17/02 0:00 AM	5/16/02 0:00 AM	Delete
Summary by production source	F	5/17/02 0:00 AM	6/17/02 0:00 AM	Delete
Product group summary by div.	F	5/17/02 0:00 AM	6/17/02 0:00 AM	Delete
Product class summary by div.	F	5/17/02 0:00 AM	6/17/02 0:00 AM	Delete
PLNR summary by source	F	5/17/02 0:00 AM	6/17/02 0:00 AM	Delete
YTD PLNR summary by prod. grp.	F	5/17/02 0:00 AM	6/17/02 0:00 AM	Delete
YTD source summ. by prod. grp.	F	5/17/02 0:00 AM	6/17/02 0:00 AM	Delete
Prd Grp/VNDR summ. by PLNR	F	5/16/02 0:00 AM	6/16/02 0:00 AM	Delete
CP01A 20020515 1231	F	5/15/02 0:32 PM	5/15/02 1:32 PM	Delete
Critical Path overview	F	5/15/02 8:15 AM	5/15/02 9:15 AM	Delete
VK02 20020510 1344	F	5/10/02 1:45 PM	5/10/02 2:45 PM	Delete
Plan vs. Actual Pivot Table	F	5/10/02 0:23 PM	5/10/02 1:23 PM	Delete

Local intranet

Figure 1-5. List of published reports

One of the great benefits of publishing reports to the server is that individual users don't need to run the same report from different workstations, wasting their time and putting an increased load on the server. Moreover, since users can view reports in the requested format, such as Excel XLS or Adobe PDF, these users can save them to their local hard disk using Microsoft Excel or Acrobat and take them on the road.

Security features allow the report owner to make the file available only to the user who requested it, a specific workgroup, or to all users. Since the queue is never erased, a log is kept of who ran what report, when, and with what criteria. Each report has an expiration period after which it will disappear from the list. The report queue itself stores the start and end times of each individual report job so that the system administrator might determine if jobs are taking too long and more memory or processors may be required. Several factors affect the length of time needed to generate a report, including the database server, database design, indexing, and performance tuning; the physical RAM and hardware performance characteristics of a server, such as RAID; and other loads on the server, if it's not a dedicated report server.

Conclusion

Proper report design is fundamental to the success of any application. Once you've completed your due diligences in selecting the reporting tools and presenting the layout and criteria options to the client, then you've paved the way for the actual development of the report.