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This book is dedicated to Carl Backstrom and Scott Spadafore.
All author royalties will be donated equally to the charity trust funds of their respective families.

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Foreword

Over four years ago I had the idea for the first edition of this book, and the reason for the book was a deeply personal one: the Oracle APEX development team had sadly lost two members of the team, Carl Backstrom and Scott Spadafore. I knew both Carl and Scott and had met them a number of times at Oracle conferences over the years and corresponded with them frequently.

I was struck that both of these individuals had helped me over the years, and I wondered what I could do to help their families in some small way in return. I came up with the idea of writing a technical APEX book and donating all author royalties to their respective families.

To ensure the book was published and didn't just remain in my head as a "good idea," I came up with a plan. I approached a number of friends and fellow APEX experts and asked if they would consider writing a chapter. I have to say when I explained the purpose of the book to each of them, they all jumped at the chance.

Following the recent release of APEX 5, we once again decided it was time to update the book, again with all author royalties going to the same good causes. Once again I'm honored to know each of the chapter authors leapt at the opportunity. I thank each of them for agreeing to help update this book and continue helping, in our small way, the families of two people who helped us all over the years.

APEX 5 is the biggest release in the history of APEX, and the Oracle development team has done a tremendous job of making the APEX development environment a more productive, functional, and extensive development platform than ever before. We hope this book helps to show you why APEX 5 is second to none in terms of rapid web development backed by the security and functionality of the Oracle Database.

On a personal note, I would like to thank Jonathan Gennick and Jill Balzano of Apress for helping to shepherd us through the process of making the book a reality and supporting each of us in bringing our chapters to completion (which I can only imagine is like herding cats at times!).

—John Edward Scott

First-Edition Foreword

When I wrote my first book, *Pro Oracle Application Express*, in 2008 (with Scott Spendolini contributing a chapter on themes and templates), I found it an extremely rewarding experience. However, like a lot of first-time authors, I found it tough to fit writing into my regular day job and other commitments. *Pro Oracle Application Express* ended up taking a lot longer than originally anticipated and ran to almost twice as many pages as originally planned, mainly because of my passion for the subject matter—I kept wanting to give more and more information.

I was extremely happy to see that when *Pro Oracle Application Express* was released, it was a big success, at times ranking in the top 1,000 of all books sold on Amazon, which is quite an achievement for a technical book, let alone for a relatively niche area like Oracle Application Express. It was also the top-selling book at Oracle OpenWorld that year.

So I'd done it. I'd written my first book, something I always wanted to do, and it was (by relative standards) a great success. However, the questions soon started: "Hey, John, when are you writing another book?" Well, my reply was, "Never again!"

Are you surprised by that answer? Well, let me qualify it. I have such respect for people like Tom Kyte (who was kind enough to write the foreword to *Pro Oracle Application Express*) and my good friend, Steven Feuerstein, who write book after book, but I simply don't know how they manage to find the time to fit it into their schedules. Writing one book, while extremely rewarding once it was published, was at times one of the toughest things I've ever done. Sitting in front of a blank page at 4 a.m., trying to meet a publishing deadline, does not quite fit the glamorous image I had of being an author.

However, two events changed my opinion on writing another book. Those events were the deaths of my two good friends, Carl Backstrom and Scott Spadafore. Both Carl and Scott were longtime members of the Oracle Application Express development team, and I have lost count of the number of times both Carl and Scott have helped me in my time as a developer with Oracle Application Express. I also had the pleasure of meeting Carl and Scott in person many times during the various Oracle conferences we all attended over the years. One of my most vivid, happy memories during an Oracle conference was the day that Carl took Dimitri Gielis and myself for a tour around San Francisco during Oracle OpenWorld. One of my other vivid memories involves a deep discussion about the internals of APEX security with Scott Spadafore, sitting in a bar late in the evening, before Scott then turned the conversation to telling jokes.

With the sad and very unexpected passing of both Carl and Scott, I wanted to do something to help both families. Carl often spoke of his daughter, and I know that Scott was extremely proud of his family too. Following the success of my previous book, I felt that the best way I could do something to help would be to write another book where *all* of the author royalties were split between the charities of the two families.

Now since I already knew how much work is involved in writing a book, I came up with the idea of asking other people if they would be interested in writing a chapter. At the ODTUG Kaleidoscope event last year (2010), I approached my good friends, the authors whose names you see in this book, and asked each of them if they would be interested in writing a chapter. I asked every one of these people because they all knew Carl and Scott personally. I have the honor of saying that not one person hesitated to step up to the challenge of donating their time, experience, and knowledge to make this book happen. For that I am deeply grateful to all the authors (in alphabetical order): Anton, Dan, Denes, Dietmar, Dimitri, Doug, Francis, Martin, Mike, Raj, Roel, and Sharon. There were many times when it looked like this book might never make it to print; it was certainly a struggle to coordinate the book deadlines with the challenges of everyone's day jobs.

So, then, this book is dedicated to two people who were always so amazingly generous with their time and help, two people who were always held in the highest regard by the Oracle APEX community, and, most importantly, two people I had the honor calling friends.

—John Edward Scott
http://jes.blogs.shellprompt.net
www.apex-evangelists.com

I was fortunate enough to meet both Carl and Scott at the ODTUG Kaleidoscope conferences in 2008 and 2009, respectively. Carl was kind enough to spend some of his personal time answering all my questions and going through some of his examples with me. After writing about enhancing a security feature in APEX, Scott called me up right away to discuss it on a weekend. He was always very helpful, especially on the forums. Both Scott and Carl were great individuals who truly loved what they did and enjoyed passing along their wealth of knowledge to others. I'm honored to be able to contribute to this book in the same spirit that Scott and Carl engaged themselves within the Oracle community.

—Martin Giffy D'Souza
www.talkapex.com
www.clarifit.com

I had the distinct privilege of getting to know both Scott and Carl at many of the seminars and user groups they attended. Scott was scary smart with a dry and unforgiving sense of humor. His knowledge of the internal workings of APEX security was unmatched, and he shared the knowledge generously both in person and on the forums. Carl was quiet until you got to know him but a great guy and awesome JavaScript coder. In the early days, he personally helped me solve a few problems on how to integrate JavaScript into APEX, and his passion for APEX and JavaScript was apparent. When John Scott approached me with the idea of the book, I didn't hesitate and am honored to be able to be part of this tribute to two truly great men.

—Doug Gault

I first got in touch with Carl and Scott "virtually" on the Internet, through the APEX forum and the blogs. They were both extremely helpful to me and everybody in the APEX community.

I believe it was in 2007, at Oracle OpenWorld, that I met Carl and Scott personally for the first time. I guess my blog post (http://dgielis.blogspot.com/2007/11/oow07-day-1-sessions-apex-meetup.html) from that time says it all: "At the APEX demo grounds I met Scott Spadafore for the first time. 'He's the man!' some say, and I must confirm. Such a nice person, a great guy!"

I liked Scott very much, not only for his knowledge (especially in security) but even more for the person he was. And then Carl…I was truly shocked when I read about his car accident. Although we met in person only at the Oracle conferences, Carl became a real friend. I remember the many chats we had (in MSN). He was just a message away…I called him "Mister AJAX" because he was so strong in all the fancy web stuff. During conferences, we always met up.

When you were with Carl, there was always something happening. He had so many great stories. He liked to go out and have fun. I will never forget one Friday in San Francisco, just after OOW: Carl spent that day with John and me and showed us the coolest places in the city. He also took us to one of the best Chinese places in Chinatown and told us some great stories about his life. I remember Carl as an exceptional person—a great friend who was always willing to help others.

Scott, Carl, I feel honored to have known you both personally, and I am happy I could contribute to this book in your honor.

—Dimitri Gielis

The first time I met Carl in real life, it was during ODTUG's Kaleidoscope in New Orleans. I got the chance to show him a plan board with a drag-and-drop feature—all built in APEX, of course. He was truly impressed by what I'd done, saying "Did you truly build that in APEX?" He even convinced me to show it to the other APEX development team members.

One of the most striking things about Carl, apart from the fact he always did his utmost best to help everybody, was his fear of presenting. Although everybody recognized Carl as the leading expert, knowing way more than everyone else, he always was so nervous. But I guess that was one of his charms as well! I also remember, during that same event, Carl, John, and myself sitting at the bar, drinking some whiskey. And every glass poured contained a fly! So we talked about the never-ending fly whiskey for a long time (after a thorough inspection, the bottle itself appeared to contain a lot of flies).

Before I met Scott for real, we had some contact on the OTN Forum. All about security, of course, because that was Scott's main focus—but he also knew an awful lot of all other Oracle stuff! The thing I remember most is a night in Monterey during which the usual suspects of APEX people got together for some food and drinks. Scott was sitting next to Raj Mattamal, who is without any doubt the fastest speaker in the Oracle world. And with that they formed two opposites: Raj rambling on about whatever, and Scott just sitting there, most of the time silently. But every time Scott did say something it was either incredibly funny or so spot on, you couldn't imagine.

We owe a lot to these two great guys. APEX wouldn't be the great product it is today without them. They are missed a lot.

—Roel Hartman

As this book is an APEX one and nobody can deny Scott and Carl's unbelievable contributions to the community, I wanted to take this dedication moment to express that these guys were first and foremost amazing people. I had the pleasure of calling these guys my friends since the early APEX days (and before), and it's their unique personalities that I'll never forget. Not a week goes by that I'm not reminded of a joke from Scott (even the bad ones) or a story from Carl —and I'm forever grateful for that. That the community could come together to put such a book as this together in tribute to them is surely a testament to their impact, but it's critically important to me that people know what great guys they were as regular people.

—Raj Mattamal
http://nianticsystems.com

Unfortunately, I never had the opportunity to meet Scott, but a quick look at the APEX forum's "Top Users in Forum" list speaks volumes about the kind of guy he was—and his name will deservedly remain there for a long time to come. The number of people that Scott was able to help, myself included, is truly impressive and inspirational.

When it came to being helpful and inspirational, Carl was very much the same kind of guy that Scott was, and I'm very grateful to have met him. He was incredibly influential in my development career, having helped me along while I learned the basics of client-side development. He even introduced me to jQuery!

I find it especially rewarding to have been asked to write a chapter on plug-ins in APEX—a topic that often involves lots of JavaScript. To me it's proof positive that people like Carl and Scott live on in those they helped and mentored. I will always strive to have the same impact on others as they had on me.

—Dan McGhan

The first time I met Scott was at my first OpenWorld in 2007. In fact, he was the first member of the APEX development team that I've had the pleasure to meet. I remember that he introduced himself and that he recognized me from the forum. He seemed happy to see me, and I immediately felt part of the community. During the same conference, I also had the chance to meet Carl and the rest of the team. They both were always available to answer questions and propose solutions. They took notes of our suggestions, and the next thing we knew they were included in the next APEX release. I have been using Oracle products for more

than 20 years, and have never seen a product team as close to their users. And that is in large part because of Scott and Carl. I am honored to contribute to this project in memory of two great colleagues and friends, and I would like to thank John for giving me the opportunity to pay tribute to them.

—Francis Mignault
http://insum-apex.blogspot.com
www.insum.ca

Pictured left-to-right: John Scott, Carl Backstrom, and Dimitri Gielis at IOUG Collaborate event 2007

Scott Spadafore (standing) deep in discussion with John Scott

About the Authors

John Scott has been using Oracle since version 7 (around 1993) and has used pretty much every release since then. He has had the good fortune to work on a wide range of projects for a varied group of clients. He was lucky enough to start working with Oracle Application Express when it was first publicly released and has worked with it nearly every day since (and loves it). John is an Oracle ACE Director and was named Application Express Developer of the Year in 2006 by Oracle Magazine. He is also the cofounder of ApexEvangelists (Apex-Evangelists.com), a company that specializes in providing training, development, and consulting specifically for the Oracle Application Express product. You can contact John at john.scott@apex-evangelists.com.

Nick Buytaert is an Oracle Certified Professional (OCP) with a bachelor's degree in applied computer science (2011). He works for a Belgian consulting firm called Contribute, which assists a wide variety of organizations in making the most of their Oracle technology stacks. Nick started his career working as an E-Business Suite consultant and then went on to specialize in APEX development. In April 2013, he became an Oracle Application Express Developer Certified Expert.

Nick furthermore participates actively in the APEX community by publishing technical articles on his blog APEXPLAINED (http://apexplained.wordpress.com). He also initiated and maintains several open source projects, such as the Oracle APEX Maven plugin and a series of APEX plugins. Nick occasionally engages in public speaking activities to share his ideas and experiences with the outside world. You can follow Nick on Twitter @nbuytaert1 to find out more about him.

Karen Cannell is president of TH Technology, a small consulting firm providing Oracle technology services, focusing on Application Express. A mechanical engineer by degree (one of them), she has analyzed, designed, developed, converted, upgraded, enhanced, and otherwise worked on legacy and commercial database applications for more than 25 years, concentrating on Oracle technologies since 1994. She has worked with Application Express since its Web DB and HTML DB beginnings and continues to leverage the Oracle suite of tools to build quality web applications for clients in government, medical, and engineering industries. Karen can be contacted at kcannell@thtechnology.com.

Martin D'Souza is cofounder and CTO at ClariFit, a consulting firm and custom solutions provider specializing in APEX and PL/SQL development. His experience in the technology industry has been focused on developing database-centric web applications using the Oracle APEX technology stack.

In addition to his day job, Martin is the author of the popular blog www.TalkApex.com. He is also a designated Oracle ACE Director and has coauthored and authored various APEX books. He has presented at numerous international conferences such as APEXposed, COUG, and ODTUG Kscope, for which he won the Presenter of the Year award in 2011.

Martin has a computer engineering degree from Queen's University in Kingston, Ontario, Canada. You can contact Martin at martin@clarifit.com.

Doug Gault is the APEX practice director at Enkitec, an Oracle Platinum partner founded in 2004, which provides consulting, education, and products based around Oracle technology. He has been working with Oracle since 1988, starting with version 5.1B, SQL*Forms 2.0, and RPT/RPF. He has focused his career on Oracle's development technologies, spending the majority of that time dedicated to web-based technologies including the OWA Web Toolkit, PL/SQL Server Pages, WebDB, Oracle Portal, and more recently HTML-DB

and APEX. Doug's many years of Oracle experience have taken him all over the world to participate in some truly groundbreaking projects. Doug has presented at and participated in roundtable discussions at a number of conferences including Oracle OpenWorld, UKOUG, and ODTUG's APEXposed and Kaleidoscope conferences. He has an associate's degree in computer science and an honorary master's degree from The School of Hard Knocks, believing there is no replacement for hard-earned experience. Doug is an Oracle Ace and can be found on Twitter as `@dgault_apex` and on his blog at `http://douggault.blogspot.com`. You can contact Doug at `doug.gault@enkitec.com`.

Dimitri Gielis has been working with Oracle Database since he began his career in 2000 with Oracle in Belgium. Dimitri was an early adopter and supporter of HTML DB and later of Application Express. After many years of honing his expertise with Oracle Database and Application Express, Dimitri cofounded APEX Evangelists in 2007. In 2014 Dimitri set up APEX R&D (`https://www.apexrnd.be`), a company that focuses on web application development and creating innovative solutions with Oracle Application Express. The company also provides on-demand coaching and training in APEX. Dimitri is an active member of the Application Express community. He routinely posts insights into Application Express on his blog at `http://dgielis.blogspot.com`. He is a frequent presenter at the Oracle Benelux User Group (OBUG), IOUG collaborate, ODTUG Kaleidoscope, the UKOUG conference, and Oracle OpenWorld. Dimitri has been an Oracle ACE Director since 2008. He received the APEX Developer of the Year award from Oracle Magazine in 2009.

Roel Hartman has been using Oracle Database since version 5. At that time, he used Oracle Case*Designer, Oracle Forms 2.3, and other tools of the day. He has used all versions of those tools as they have evolved during the years since, giving him great depth of experience as an Oracle Database developer. Today he is a fierce advocate and user of Oracle Application Express. Roel has a master's degree in business informatics from the University of Twente in the Netherlands. He is an Oracle ACE Director. He works for Logica in the Netherlands as a lead technical architect. Roel has presented at all major Oracle conferences, such as ODTUG, Oracle OpenWorld, and UKOUG. He is a regular contributor to the OakTable Network APEX Forum.

Denes Kubicek is the chief executive officer and founder of bi-Cubes. He has been working with Oracle for more than 12 years. Denes is an Oracle ACE Director and was APEX Developer of the Year in 2008. Denes is also a coauthor of the first APEX book in German, *Oracle APEX und Oracle XE in der Praxis*. You can reach him at `bi-Cubes.com`.

Raj Mattamal is copresident of Niantic Systems, LLC (`NianticSystems.com`). He started developing web applications at Oracle in 1995 with the same people who came to create Oracle Application Express. In his more than ten years with the company, he helped customers in a wide range of industries to deliver web-based solutions on the Oracle Database. In addition to helping customers with their applications, Raj developed numerous web applications for use internally at Oracle. Outside of database application development, Raj spent much remaining time with Oracle evangelizing Oracle Application Express. This entailed teaching Oracle software development and APEX classes globally, writing articles for Oracle Magazine, writing Technotes for the Oracle Technology Network, and assisting with the development of training material and workshops.

Having earned a bachelor's degree in decision and information studies and another in marketing from the University of Maryland, Raj continues to apply his knowledge of and passion for technology and business to real-world issues. Since leaving Oracle in 2006, Raj offers his services and training to customers in a wide range of business lines to help them get the most out of their Oracle environments. In recent years, Raj has been recognized by his Oracle professional colleagues as an Oracle ACE Director, an honor, indeed, to be earned among so many knowledgeable colleagues.

Dan McGhan is a senior technical consultant with the Accenture Enkitec Group. He suffers from compulsive programing disorder, which is believed to be linked to his balding. Having started his development career in the land of MySQL and PHP, he was only too happy to have stumbled upon APEX. Since then he's dedicated his programming efforts to learning more about Oracle and web-based technologies in general. Dan is an Oracle Application Express Certified Expert, an Oracle PL/SQL Developer Certified Associate, and an Oracle

ACE. In addition to his "day job," he is one of the top contributors to the APEX forum, maintains his own Oracle and APEX blog (www.danielmcghan.us), and is a regular presenter at various events and user group meetings.

Francis Mignault is chief technology officer and cofounder of Insum Solutions. He has been working with Oracle Database for more than 23 years and is a certified Oracle database administrator. Francis began his work with APEX in 2004, when it was called HTML DB. He and his team have developed bilingual software as a service application that is now used by more than 60,000 active users. Francis is deeply involved in the APEX community. His first-rate PL/SQL and APEX expertise led to becoming the first APEX instructor in Quebec. He has presented at several APEX seminars and conferences in the United States and Canada, including Oracle OpenWorld, IOUG Collaborate, ODTUG Apexposed, ODTUG Kaleidoscope, and Ora*GEC.

Tom Petrus started out as an in-house Oracle Forms developer in 2007 and made the switch to Oracle Application Express in 2011 as a consultant. Since then he has had a wide range of projects and clients by which he has honed his knowledge on Apex. He has a preference for everything JavaScript related and is active on both StackOverflow and the OTN Apex forum, helping others solve problems and picking up new nuggets of knowledge in the process. He currently works as a consultant for iAdvise Belgium.

Jorge Rimblas is a senior technical consultant with the Accenture Enkitec Group and has been an Oracle Database professional since 1995. He started using APEX when it was known as HTML DB, starting with version 1.6. Since 2008, APEX is all he does. His areas of expertise include Oracle Application Express, Oracle e-Business Suite, Oracle Database, and related products. Jorge has helped several companies, in diverse industries, implement custom themes for their applications. His knowledge and experience with UI design, web technologies, and Adobe Photoshop uniquely position him to excel at this kind of work. He has taught APEX to dozens of people and has been a speaker at the RMOUG Training Days and ODTUG KScope conferences. Jorge is an Oracle ACE and can be found on Twitter as @rimblas and on his blog at http://rimblas.com/blog.

Christoph Ruepprich has worked as an Oracle DBA and developer since 1999. As a developer, he has worked with Oracle Forms and Reports and has extensive experience with Oracle Application Express. In his current role as senior technical consultant at Accenture Enkitec Group, he works on various APEX projects. He is also an active presenter on APEX topics at conferences and maintains an Oracle-related blog at http://ruepprich.wordpress.com.

About the Technical Reviewers

Patrick Cimolini specializes in project management, development, and training services for Oracle Application Express projects. Formal training in engineering, business administration, and project management is complemented by more than 30 years of experience that has evolved through mainframe, client-server, and web platforms. Patrick enjoys attending and presenting at Oracle-centric conferences such as Kscope, Collaborate, APEXposed, and Oracle OpenWorld, all of which have contributed significantly to his professional and personal growth. Patrick is currently working at Insum Solutions in Montréal, Québec.

Alex Fatkulin is a master of the full range of Oracle technologies. This mastery has been essential in addressing some of the greatest challenges his customers have met.

Alex draws on years of experience working with some of the world's largest companies, where he was involved with almost everything related to Oracle databases, from data modeling to architecting high-availability solutions to resolving performance issues of extremely large production sites.

Alex has a bachelor's of computer science degree from Far Eastern National University in Vladivostok, Russia. He is also an Oracle ACE and a proud OakTable member.

Vincent Morneau is a developer, blogger, and speaker. He has been working with APEX for more than five years in the world's largest APEX development team at Insum Solutions. His focus has recently shifted to the front-end aspect of development, where he shares his vision throughout Twitter at `@vincentmorneau` and his blog at `http://vmorneau.me`.

Vincent is also a big fan of open source coding, and he systematically shares any piece of code that he finds valuable on his GitHub account at `https://github.com/vincentmorneau`.

He is on his way to earning a bachelor's degree in software engineering by the end of 2015 and will finally be able to dedicate more time to the APEX community.

CHAPTER 1

Page Designer

by Denes Kubicek

The Page Designer in APEX 5.0 is one of the main new features and a major improvement for APEX developers. It changes the way you build your application pages and also the way you think about application development. It is also close to what you probably know from Oracle Forms. The Page Designer provides these new features:

- Drag-and-drop functionality
- Tree view and context menus
- Seamless adjustment of the Component View and Property Editor panels

Main Components

The Page Designer has four main components (Figure 1-1).

- Navigation toolbar
- Component View on the left side of the screen
- Grid Layout for drag-and-drop functionality in the middle
- Property Editor on the right side of the screen

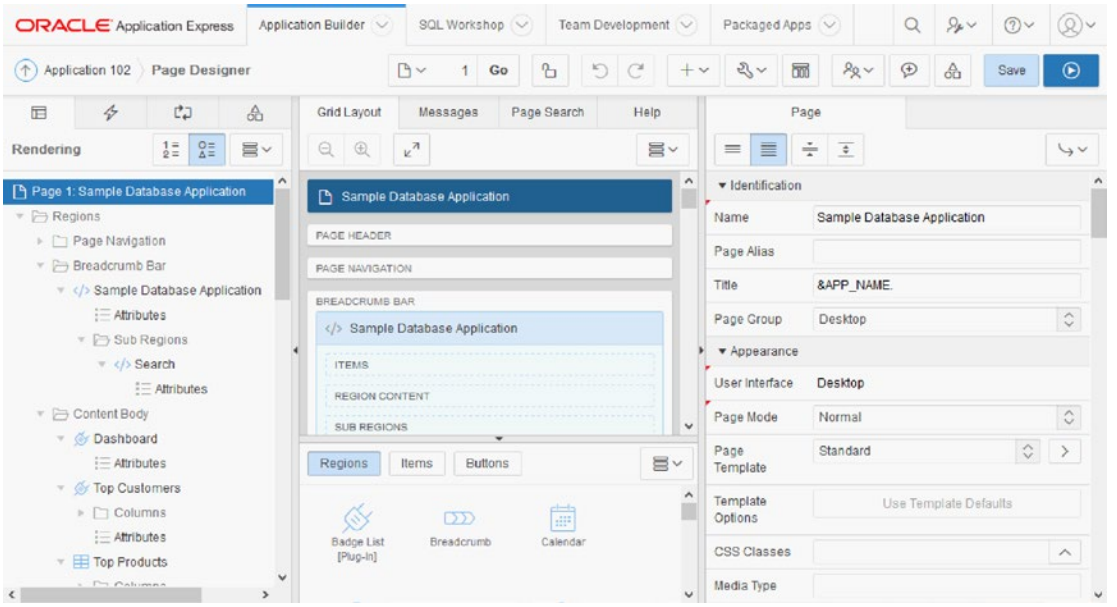

Figure 1-1. *Page Designer components*

Navigation

The navigation toolbar has lots of new options compared to previous versions of APEX. Some of them have been reworked, and their functionality is now different. Also, there are some new options that I will describe in detail.

Page Finder Icon

The Page Finder icon works differently compared to the old one. It will lead you to a page you type in directly or will open a modal window if you click the pop-up list of values (see Figure 1-2 and Figure 1-3).

Figure 1-2. *Page Finder icon*

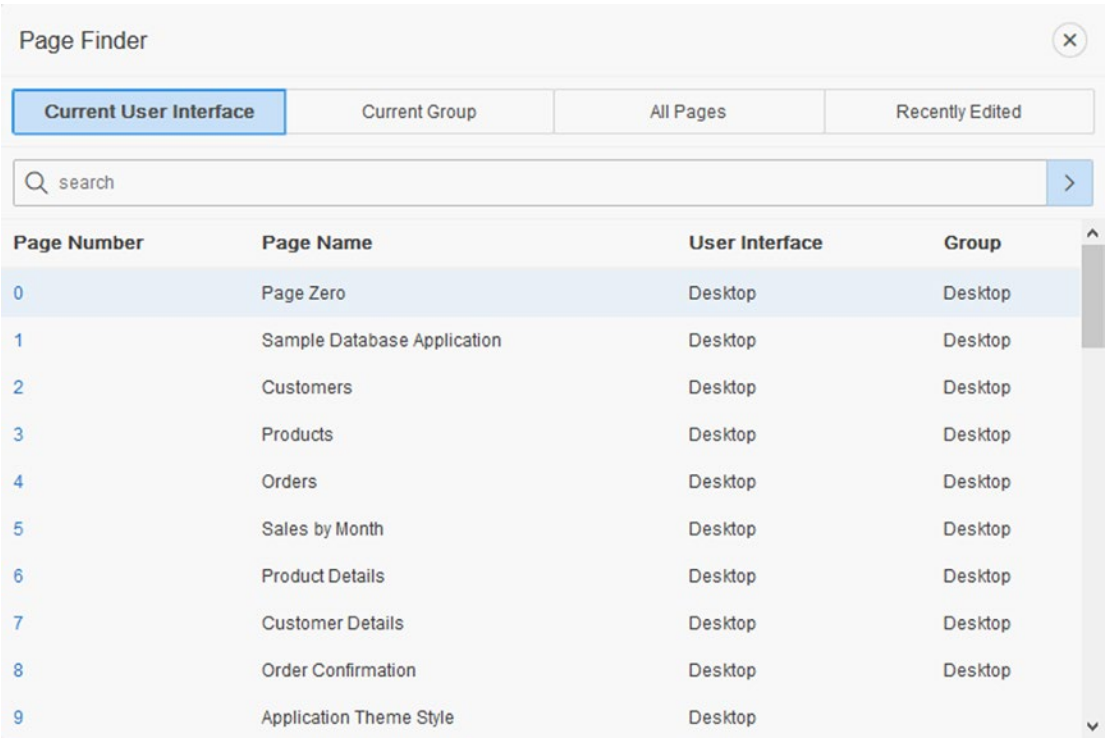

Figure 1-3. *Page Finder list of pages*

The Page Finder will also show a warning via a pop-up if you are leaving a page with unsaved changes (Figure 1-4).