

UDC 004.02

**INSTALLATION OF THE DATABASE FOR MOBILE SEARCH SERVICE
OF CITY TRANSPORT ROUTES FOR IOS PLATFORM****SIARHEI RAZANAU, EUGENIY SUKHAREV**
Polotsk State University, Belarus

Some peculiarities of cross platform Realm database installation are covered. The illustrated step-by-step instructions are described.

The main place of use of the application will be a public transport stop, where not every user has permanent access to the Internet. In order for the application to work without the Internet, the offline mode to store information about routes on devices is required. To store the information, a cross-platform mobile database Realm has been selected. Its advantages and the installation features are described in the article.

Realm is a cross platform mobile database for iOS (available in Swift & Objective-C) and Android. Realm has been created to make it better and faster than SQLite and Core Data. It is not only better or faster, it is also easier to use and we can do many things with just a few lines of code. Realm is totally free and we can use it without any limits. Realm is made to target mobile apps and it is a novelty, as we did not observe any innovation in mobile databases in the last decade. Earlier to deal with a mobile database, we had only one option, which was SQLite or any wrapper that uses SQLite behind the scene like Core Data. Realm is designed to be easy to use as it is not the ORM and it uses its own persistence engine for greater performance and speed.

Realm is incredibly fast and easy to use and it will require just a couple of code lines to accomplish any task, be it reading the database or writing information down in it. Below are all the reasons and advantages, which make Realm the best choice to work with a database in a mobile app:

- Easy Installation
- Speed
- Cross Platform
- Scalability
- Good Documentation & Support
- Reliable
- Free

There are some prerequisites to work with Realm:

- iOS 8 or later, OS X 10.9 or later.
- Xcode 6.3 or later.
- Realm has two releases, one for Swift 2.0 and one for Swift 1.2. Realm for Swift 2.0 is recommended for use. Developers can use it for Swift 1.2 but it will not be supported with Realm team in the future so to be safe it is better to use the release of Swift 2.0.

Configuring Xcode. Before configuring the Xcode project, make sure to have installed CocoaPods in the computer as it will be used for installing Realm in the Xcode project.

After that navigate to the project directory in the terminal and execute the "pod init" command to initialize the CocoaPods.

Then open the pod file generated with Xcode and edit it to add the pod 'RealmSwift' right after the target, so it should be something like this (Fig. 1):

```
# Uncomment this line to define a global platform for your project
# platform :ios, '8.0'
# Uncomment this line if you're using Swift
# use_frameworks!

target 'RealmTasks' do
  use_frameworks!
  pod 'RealmSwift'
end
~
```

Fig. 1. Terminal Window

ITC, Electronics, Programming

Next, run the command “pod install” to download the install Realm in the project. After this, a new Xcode workspace will be generated next to the project file. Then open the **workspace** instead of the xcodeproj.

Now Xcode is ready to work with Realm, but some tools need installing to make working with Realm easier.

Installing Realm Plugin in Xcode. Realm team has provided a very useful plugin for Xcode that will be used for generating Realm models. To install the plugin, Alcatraz can be used. Alcatraz is a very simple and useful open source package manager to automatically install plugins, templates, or colors in Xcode. To install Alcatraz just paste the following command in the terminal and then restart Xcode:

```
curl -fsSL https://raw.githubusercontent.com/supermarin/Alcatraz/master/Scripts/install.sh | sh
```

Then in Xcode, select Window and select Package Manager. A popup window will open to choose which plugin or template to install in Xcode, in the search bar we can search for any plugins or color templates to customize Xcode. Write “Realm” in the search bar and a “RealmPlugin” plugin will appear, then click on Install.

Realm Browser. The last tool to install is Realm browser. This browser helps read and edit any realm databases files. These files are created in the app with all the information about entities, attributes and records inside the database tables. These files can be shared among different platforms like iOS or Android. To download the realm browser tool visit iTunes store to download the latest version. Open the app, then, choose Tools -> Generate demo database. It will generate the test database realm file without the database. It should look like this: (Fig. 2):

CLASSES	integerValue	boolValue	floatValue	doubleValue	stringValue	dateValue	arrayReference	
	Int	Boolean	Float	Float	String	Date	[RealmTestClass0]	
RealmTestClass0	2,587,986	<input type="checkbox"/>		34.126	651.525 C4D27739-9761-4A76-BA7E...	Mar 17, 1995, 3:54:15 PM	RealmTestClass0	
RealmTestClass1	-9,223,372,036,854,775,808	<input type="checkbox"/>		606.498	553.517 E5438647-A552-46D7-82F0...	Jun 30, 1985, 4:26:29 AM	RealmTestClass0	
RealmTestClass2	7,872,464	<input checked="" type="checkbox"/>		452.748	86.876 B6269C40-888C-4AB4-84D2...	Jan 21, 1989, 10:41:06 PM	RealmTestClass0	
	5,763,947	<input checked="" type="checkbox"/>		574.209	570.983 4A7CD1EA-D05C-49C5-AB6...	Oct 10, 2010, 7:19:07 PM	RealmTestClass0	
	9,223,372,036,854,775,807	<input checked="" type="checkbox"/>		596.749	824.058 D0B0AFD9-3FBF-4DC8-9911...	Oct 1, 1993, 4:19:01 AM	RealmTestClass0	
	-9,223,372,036,854,775,808	<input checked="" type="checkbox"/>		829.718	292.038 8B143699-96C1-4FB0-8CC9...	May 30, 2006, 7:24:36 AM	RealmTestClass0	
	5,553,407	<input type="checkbox"/>		246.287	4.592 A0798ACA-C4F7-451B-9610...	Mar 23, 1993, 11:54:01 PM	RealmTestClass0	
	0	<input type="checkbox"/>		371.921	958.123 2F235F95-1A3-489D-A09F...	Nov 11, 1992, 7:41:28 PM	RealmTestClass0	
	7,797,429	<input checked="" type="checkbox"/>		357.458	746.668 3054B836-260C-431F-968C...	Nov 24, 1994, 8:24:18 PM	RealmTestClass0	
	3,446,742	<input checked="" type="checkbox"/>		946.550	0.000 D84379A4-6C5C-4088-8C72...	May 22, 1992, 11:33:52 PM	RealmTestClass0	
	9,375,493	<input type="checkbox"/>		562.473	562.305 6AE8B27D-7300-43C7-9646...	Aug 4, 2000, 8:11:38 AM	RealmTestClass0	
	833,436	<input checked="" type="checkbox"/>		329.155	287.326 B12F9499-79A5-45FE-A1E4...	Dec 21, 1984, 4:13:36 PM	RealmTestClass0	
	5,091,883	<input checked="" type="checkbox"/>		730.948	0.000 3AF8E8D6-98C7-4D9F-8F9E...	May 1, 2012, 8:21:35 PM	RealmTestClass0	
	2,233,324	<input checked="" type="checkbox"/>		8.346	133.868 EA6D157A-F68B-4B74-8D59...	Dec 28, 1994, 7:11:19 PM	RealmTestClass0	
	1,474,698	<input type="checkbox"/>		328.805	369.594 51939A9E-22B3-452E-B22D...	Dec 21, 1989, 4:48:26 PM	RealmTestClass0	
	9,223,372,036,854,775,807	<input type="checkbox"/>		471.314	247.478 754D18C9-B9A2-4920-B48D...	Mar 6, 1997, 9:37:25 AM	RealmTestClass0	
	7,314,639	<input checked="" type="checkbox"/>	340,282,346,638,529,000.00...		0.000 B2A042B2-75B2-424E-A7D4...	Apr 18, 1998, 8:41:31 AM	RealmTestClass0	
	4,235,410	<input type="checkbox"/>		121.388	721.002 D7A946D8-DF11-4BA0-BC8...	Nov 24, 1995, 7:20:14 PM	RealmTestClass0	
	0	<input checked="" type="checkbox"/>		99.814	890.230 5F1C5C66-4778-402B-855F...	Nov 13, 1989, 6:29:29 AM	RealmTestClass0	
	2,056,252	<input type="checkbox"/>		991.763	940.183 80996059-9EE5-4CF7-AA26...	Feb 4, 2009, 9:02:47 PM	RealmTestClass0	
	5,443,164	<input checked="" type="checkbox"/>		627.829	785.671 AED8E678-C684-44E8-9799...	Dec 27, 2000, 11:21:29 AM	RealmTestClass0	
	1,215,412	<input checked="" type="checkbox"/>		639.936	179,769,313,486,232,000.00...	2477B3F7-0BA8-45CE-BAF8...	May 19, 1995, 5:38:24 PM	RealmTestClass0
	9,430,952	<input type="checkbox"/>		904.770	785.639 FDDA4F50-5F19-4898-94B3...	Jul 24, 1988, 8:06:54 AM	RealmTestClass0	
	291,104	<input checked="" type="checkbox"/>		0.000	284.723 54137984-793D-46AA-A91E...	Oct 10, 2010, 11:24:17 AM	RealmTestClass0	
	3,208,034	<input type="checkbox"/>		87.057	155.790 FE1A5385-1587-4B63-9A2E...	Nov 17, 2013, 5:19:42 PM	RealmTestClass0	
	8,165,711	<input type="checkbox"/>		240.522	413.564 60C03BB8-5F50-46EA-A521...	Jul 1, 1984, 4:42:21 PM	RealmTestClass0	
	9,670,106	<input checked="" type="checkbox"/>		872.222	583.801 88233C6A-E57B-47FE-B332...	Aug 28, 1985, 4:00:10 AM	RealmTestClass0	
	839,595	<input type="checkbox"/>		0.000	921.081 9542FC76-FF51-4F7F-A2B0...	Jun 19, 2010, 11:33:22 AM	RealmTestClass0	
	8,814,731	<input type="checkbox"/>		499.651	0.000 20ABDB1B-D18C-4171-823...	Oct 1, 1986, 8:57:42 PM	RealmTestClass0	
	8,372,659	<input type="checkbox"/>	340,282,346,638,529,000.00...		831.261 F7977F74-FCFE-434A-A1B2...	Jun 15, 1992, 9:32:17 AM	RealmTestClass0	
	6,480,559	<input checked="" type="checkbox"/>		849.973	0.000 DD41906A-D8B3-4156-A336...	Aug 16, 2001, 6:24:50 AM	RealmTestClass0	
	7,211,049	<input checked="" type="checkbox"/>		89.867	33.321 F80DE8AE-8768-4CBB-9382...	Feb 4, 1998, 5:26:43 PM	RealmTestClass0	
	8,527,337	<input type="checkbox"/>		103.180	94.278 F6766FFC-D3DB-4FDF-BDF...	Sep 28, 2012, 10:08:23 PM	RealmTestClass0	

Fig. 2. Realm Browser

Now everything is ready for the work with Realm.

To create Realm model classes, simply create normal Swift classes that extend the Object class. Think of Object as the base class for all Realm model classes. It is also possible to extend any class that extends Object at the end. Realm supports various types of properties such as:

- Int, Int8, Int16, Int32, and Int64
- Boolean
- Float
- String
- NSDate
- NSData
- Class extends Object => Used for One-to-one relations
- List<Object> => Used for one-to-many relations

List as well as Realm class contains a collection of the Object instances (see the screenshot of the demo database (Fig. 2)). The last column is an array of pointers for the existing records in another table. While working with Realm model classes, we have to know that we can deal with them like with any other Swift classes. For example, we can add methods or protocols and use them like any other Swift class.

To generate a Realm class, go to Xcode and create a new file. In the right sidebar, choose Realm (Fig. 3):

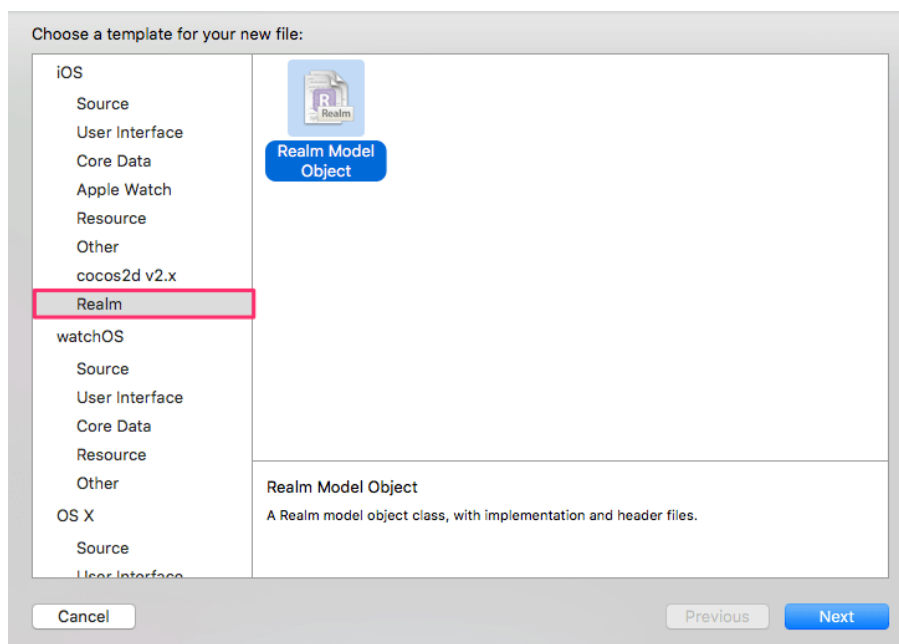


Fig. 3. Realm Class Generation

With the help of the instructions given above, Realm can be used in various projects.

REFERENCES

1. Realm [Электронный ресурс]. / Realm Swift. – 2015. – Режим доступа: <https://realm.io/docs/swift/latest/>. – Дата доступа: 14.12.2015.

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PROGRAMMING MODEL OF SIDE-VIEW SYNTHETIC APERTURE RADAR

ALIAKSANDR PRONIN, MIKHAIL IVANOU
Polotsk State University, Belarus

The article considers the principle of operating a side-view Synthetic Aperture Radar on an unmanned aircraft, its mathematical model and software model algorithm, the results of the synthesis of radar images obtained by probing the Earth's surface relief area.

Introduction: currently, monitoring the state of the earth's surface, mapping and obtaining information about certain earthly objects are implemented by radio-wave systems. As such, synthetic aperture radar (SAR) systems are used, which are installed on board of space and ground-based aircrafts. The result is high resolution, and the information obtained is characterized by high detail [1].

When using a synthetic aperture method, a high resolution synthetic aperture formation is achieved as a result of the translational movement of the aircraft carrying the antenna, which radiates probe signals in a direction perpendicular to the track. The spatial resolution of the SAR can be made sufficiently high, regardless of the altitude of the aircraft.

Nowadays the SAR uses digital signal processing techniques. This makes it possible to realize the synthetic aperture antenna algorithms in real time and in terms of an arbitrary maneuvering aircraft. The challenge of digital processing of radar image (RI) is solved by programmable logic integrated circuits (PLIC) of FPGA type, due to their high performance and concurrency work. Also, FPGA is ideal for multiplication operation [2], which is an integral part of radar data processing.

The goal: to develop a program SAR model, which will be the basis for synthesis algorithms development and radar images correction.