The Coevolution of Mobile OS User Market and Mobile Application Developer Community

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Abstract: Mobile computing is becoming increasingly popular. Accordingly, mobile OS (operating systems) are becoming standard platforms for regular computer and phone users. This paper studies the evolution and the current status of mobile OS user market and mobile application developer community. In particular, we study how smartphone mobile OS user market coevolves with its application developer community. Through this study, we highlight the symbiosis relations between mobile OS user market and mobile apps developer community.

Keywords: Mobile OS; Smartphone OS; user market; developer community

I. INTRODUCTION

Mobile computing devices include handhelds and tablets. The handheld family includes feature phones, PDAs, and smart phones. Due to the technology advances, smartphones could carry hardware devices with similar performance as desktops or notebooks. On the other hand, more and more software platforms and application programs (apps) are being developed for smartphones. Accordingly, smartphones are becoming more and more popular for regular users. The symbiosis relations among smartphones, OS (operating systems), and apps (application programs) could be characterized as typical behaviors in an information technology ecosystem [1].

Apps play an important role in attracting potential users in the Smartphone market. Because apps are developed under certain OS platforms and OS are usually tied to specific brands of smartphones, the mobile apps developer community could affect and/or be affected by the market share of mobile OS.

This paper studies the relation between the evolution of smartphone mobile OS market share and the evolution of smartphone mobile apps developer community. We also analyze the current status of smartphone mobile apps developer community, through which we hope to view the competitions among smartphones from a different perspective.

II. MOBILE (SMARTPHONE) OPERATING SYSTEMS

In this paper, we study 8 major smartphone mobile OS that are accounted for over 99% of the current user market share. They are Android, IOS, Palm, Windows Mobile and Windows Phone, BlackBerry, Symbian, Maemo, and Limo. Their general descriptions are provided in Table I. It is worth noting that Java ME is not included in this study. The reasons are twofold. First, we do not consider Java ME as a standalone mobile OS; we consider it as a platform for developing a mobile OS. Second, although Java ME is widely used in mobile phones (feature phones) and PDAs, currently it is not commonly supported by the smartphone community. Windows Mobile and Windows Phone are two different mobile operating systems. Since the first release of Windows Phone in 2010, it is gradually replacing Windows Mobile. Some data used in this study do not differentiate Windows Mobile and Windows Phone. Therefore, in this study we combine them together as one branch of mobile OS.

In this paper, the mobile OS user market share data are retrieved from Net Application [2]. Net Application is a source of applications for webmasters and eMarketers. It includes market share data of operating systems, web browsers, and search engines.

TABLE I. GENERAL DESCRIPTIONS OF EIGHT MAJOR SMARTPHONE MOBILE OS

| OS	Company	OS family	Major languages used
Android	OHA/Google	Linux	C, C++, Java
iOS (iphone)	Apple	Darwin	Objective C, C/C++
Palm (webOS)	Palm/HP	Linux	C
Windows Mobile and Windows Phone	Microsoft	Windows CE	C++
BlackBerry	RIM (Blackberry)	Mobile OS	Java
Symbian	Symbian Foundation	Mobile OS	C++
Maemo	Nokia	Linux	C++
Limo (Tizen)	Tizen, Intel, Samsung	Linux	C/C++

III. MOBILE (SMARTPHONE) APPLICATION DEVELOPER COMMUNITY

Mobile computing devices and mobile OS need the support of application programs (apps) to attract potential users. As with any other software programs, there are two lines of mobile application development: closed source and open source. Open-source community plays an important role in this filed, because of the relatively simple requirement of mobile apps. Some of the open-source mobile application development is supported by for-profit organization, such as Apple, Google, and HP; some is purely supported by non-profit organizations.

In this paper, the mobile apps developer data are retrieved from the Sourceforge research data archive of the University of Notre Dame [3] [4] [5] [6], Google code [7], Git Hub [8], and CodePlex [9]. Sourceforge [10], Git Hub, and CodePlex are the leading open-source software hosting sites and code repositories. They are ranked as the top 4 most popular sites for open-source developers [11]. The Sourforge dataset is a ready to query database and contains monthly projects status records for more than 10 years. Data about the other three repositories are retrieved directly through searching their project-hosting web sites.

IV. RESULT AND ANALYSIS

Figure 1 shows the evolution of the user market share of major mobile OS. It can be seen, since 2008, Apple's iOS has been the dominating mobile OS in smartphone market. Another important trend is that Android has been gradually gaining market share since 2009. Currently, iOS and Android are the two influential mobile OS in the smartphone market. It is also worth noting that between 2008 and 2009, the market shares of iOS and Symbian changed dramatically. This is due to the adoption of new calibration methods by Net Application. Also because Java ME is not considered a mobile OS, the data presented here are adjusted accordingly.
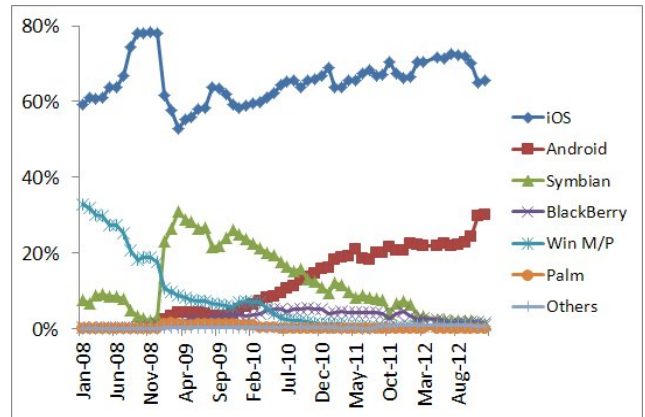
Figure 1. The evolution of the user market share of major smartphone mobile OS.

Sourceforge is the largest and the most popular open-source code repository. With no exceptions, it is also one of the most popular hosts of mobile application development. Before 2008, most of the mobile applications are for feature phones and PDAs. After 2008, smartphone apps gradually replaced feature phone apps and PDA apps. In this paper, we only focus on smartphone apps, so only the applications added after 2008 are considered here (the projects set up before 2008 are not included). Figure 2 shows the number of mobile application projects in Sourceforge. Because these projects are set up after 2008, it is reasonable to consider these applications are for smartphones instead of feature phones. From Figure 2 we can see currently that Android has the largest number of application projects, which are followed by Symbian, iOS, Windows Mobile/Phone, etc. Figure 3 shows the number of mobile application developers joined in Sourceforge since 2008.
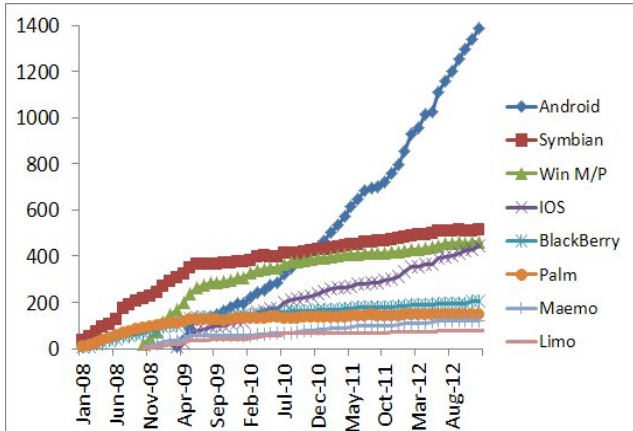
Figure 2. The Number of mobile application projects in Sourceforge.
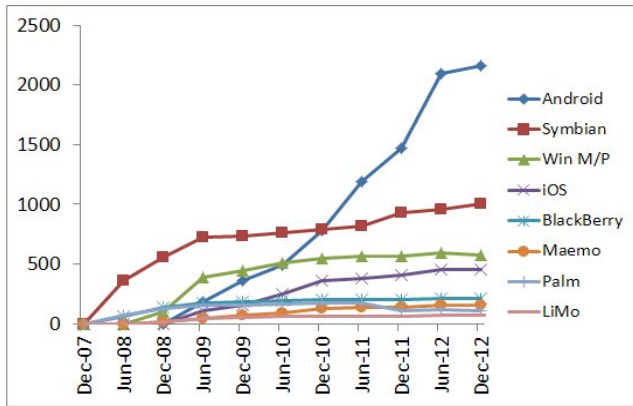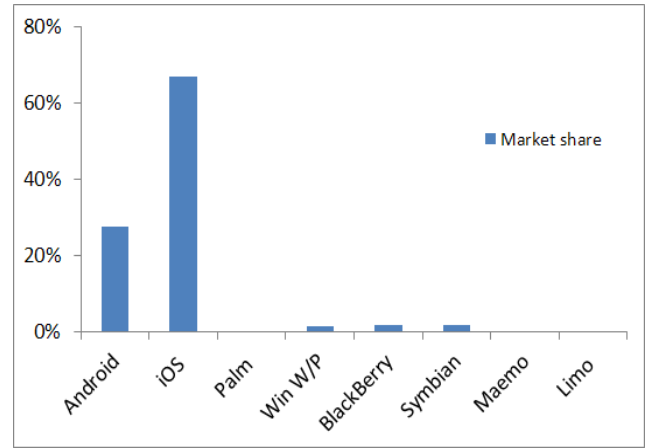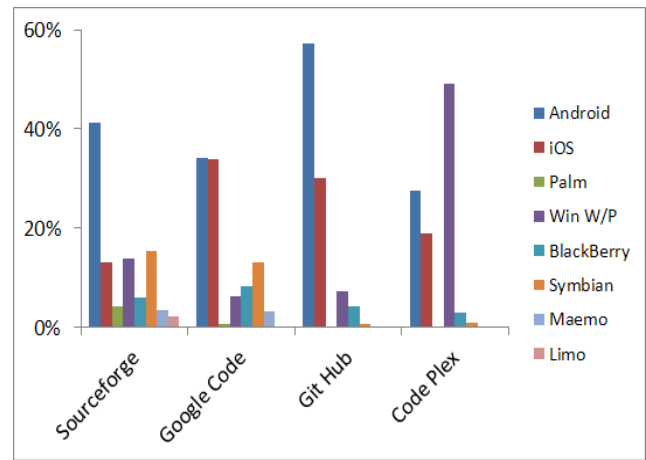

Figure 3. The number of mobile application developers in Sourceforge.

(a)

(b)

Figure 4. Comparisons of (a) current mobile OS market share with (b) current mobile apps popularity in four code repositories.

It is worth comparing Figure 1 with Figure 2 and Figure 3. We can see Android has growing trends in both market share and number of apps and number of app developers in Sourceforge. The market share of iOS is relative stable and the number of apps and the number of app developers in Sourceforge are also in increasing trend, but they grow slower than Android. The number of apps and the number of app developers for other OS are relatively stable. Based on the above analysis, we can see the symbiosis relation between mobile OS user market share and mobile apps developer community: market share could affect developer community and developer community could also affect market share. Their evolutions are correlated.

To further illustrate the relations between mobile OS user market share and mobile apps developer community, we compare current (as of January 2013) mobile OS market share with current percentage of mobile applications in four different open-source code repositories. The result is shown in Figure 4, where each type of mobile apps is represented as the percentage over the total mobile apps in its repository.

From Figure 4(b) we can see that the top two most popular mobile apps in Sourceforge, Google Code, and Git Hub are Android and iOS. This observation largely matches the current market share of mobile OS shown in Figure 4(a). However, we could also see that there are more Android apps than iOS apps in all four code repositories. Based on this observation, we anticipate the market share gap between iOS and Android could become smaller for the coming years due to the effect of mobile apps community.

We have demonstrated the correlations between mobile OS market share and mobile apps developer community. In the following, we are going to study how mobile apps developer community could affect each other. To illustrate the relations between mobile apps developer communities, we study the mobile apps developers (all the data) in Sourceforge as of January 2013. For the 8 mobile OS listed in Table I, there are 6322 developers, in which 6021 participate in a single mobile application project while 301 participate in more than 1 mobile apps development.

For the 301 multi-project developers, 220 work on different apps for the same mobile OS, 81 work on different apps for different mobile OS. Table II shows the number of developers working on multiple apps for the same mobile OS in Sourcefore. For example, there are 58 developers who work on two Palm apps and there is 1 developer who works on 6 Android apps. We can see Palm apps developers are most likely to work on several apps. However, Palm OS has a long history; most of its apps are for PDAs instead of smartphones. Therefore, consider the short history of Android, which is a pure smartphone OS, its developers are more engaging in multiple Android apps development.

TABLE II. NUMBER OF DEVELOPERS WORKING ON MULTIPLE APPS FOR THE SAME MOBILE OS IN SOURCEFORE

Number of apps	2	3	4	5	6
Palm	58	17	5	1	0
Symbian	28	7	1	0	0
BlackBerry	2	0	0	0	0
Win M/P	6	1	1	0	1
Maemo	6	0	0	0	0
LiMo	0	0	0	0	0
Android	64	10	3	0	1
iOS	6	2	0	0	0

Table-III shows the number of developers working on multiple apps for different mobile OS. For example, there are 9 developers working on both Android apps and Palm apps and 8 developers working on both Android apps and iOS apps. The cross-platform developers can help bring features of one mobile app to another mobile app. Again, we can see that Android developers in Sourceforge are leading in participating cross-platform mobile apps development. As we mentioned before, Sourcefore is the most popular open-source code repository. The behaviour of mobile apps developer community in Sourcefore might represent other mobile apps developer communities, i.e. Android apps developers are more active and engaging in cross-platform projects. The introduction of similar apps from other smartphone OS into Android could influence its user market share.

TABLE III. NUMBER OF DEVELOPERS WORKING ON MULTIPLE APPS FOR DIFFERENT MOBILE OS IN SOURCEFORE

	Palm	Symbian	BlackBerry	Win M/P	Maemo	LiMo	Android	iOS
Palm		5	0	3	1	1	9	1
Symbian	5		1	9	2	0	22	2
BlackBerry	0	1		1	0	0	4	1
Win M/P	3	9	1		2	0	8	3
Maemo	1	2	0	2		2	1	2
LiMo	1	0	0	0	2		0	0
Android	9	22	4	8	1	0		8
iOS	1	2	1	3	2	0	8	

V. CONCLUSIONS

In this paper, we studied the evolution of mobile OS user market share and the evolution of the mobile apps developer community. We found mobile OS user market share is correlated with mobile apps developer community. The current growing trend of Android apps developer community could influence its user market share for the years to come.

VI. ACKNOWLEDGEMENTS

VII. REFERENCES

[1] Yu, Y. 2013 Market-Driven Software Ecosystem. IT Professional, http://doi.ieeecomputersociety.org/10.1109/MITP.2012.102.

[2] Netmarketshare, http://www.netmarketshare.com.

[3] Gao, Y., Antwerp, M. V., Christley, S. and Madey, G. 2007 A Research Collaboratory for Open Source Software Research. In the Proceedings of the 29th International Conference on Software Engineering + Workshops (ICSE-ICSE Workshops 2007), International Workshop on Emerging Trends in FLOSS Research and Development (FLOSS 2007), Minneapolis, MN, May 2007.

[4] Antwerp, M. V. and Madey, G. 2008 Advances in the SourceForge Research Data Archive (SRDA), The 4th International Conference on Open Source Systems, IFIP 2.13 - (WoPDaSD 2008), Milan, Italy, September 2008.

[5] Madey, G. ed., The SourceForge Research Data Archive (SRDA). University of Notre Dame, http://srda.cse.nd.edu/

[6] SourceForge.net Research Dataset, http://zerlot.cse.nd.edu/mediawiki/index.php?title=Dat aset

[7] Google Code, http://code.google.com/

[8] Git Hub, https://github.com/

[9] CodePlex, http://www.codeplex.com/

[10] SourceForge, http://sourceforge.net/

[11] Comparison of open source software hosting facilities, http://en.wikipedia.org/wiki/Comparison_of_open_sou rce_software_hosting_facilities