



Electronic Design & Automation Industry- An Open Source Survival Issues

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ABSTRACT

Open Source companies have always been sticking to the fundamental principle of the Open Source community, i.e., sharing of resources for free. Not just one or two, but many companies are into the same track. For an amateur in the Open Source Domain, certainly a couple of giant questions arose, as what keeps them going even when the 'Resource Sharing' is to be kept for free? Aren't monetary gains considered here? Is just a 'motivation' the sufficient force behind the survival of these companies or other gains also exist? The aim of this paper is to find the answers of such questions. Also is being tried-out to find about the facts about the Electronics Design & Automation (EDA) industries who has established themselves as the role models for the starters, even knowing high EDA market trends. The survival issues have been considered for them. The paper also throws some light on turn-over of some of the major players just to highlight the role of Open Source in profit making. This paper will follow a straight approach of showcasing major players in the EDA field and then their counterparts in the Open Source EDA field, and then comparing their strategies and concluding by trying to figure out the future of latter.

KEYWORDS : Open Source, Open Source Software, EDA, Survival Issues, EDI, Synopsis, Cadence, Mentor Graphics, Magma, Kickfire, LINUX foundation.

I. INTRODUCTION

EDA industry has always been a considerably looked upon industry ever since it took birth. Soon the role of EDA was realized in each and every niche of technology. The industry also created some potential players, who are now champions of their respective playgrounds. The changing times saw some trends off the tracks like coming up of Open Source, sharing of resources, formations of non-profit organizations and some mergers of commercial and non-commercial associations. Similarly EDA industry is also witnessing the germinating inclination towards the Open Source and in the past few years, the amalgam of both, has blossomed into the fruits of huge reservoirs of resources and minds that are contributing towards the growth of EDA.

At the same time, it is hard known fact that without any monetary aid no company can succeed. The major sources of finance for Open Source companies are the donations/grants by the Open Source contributors who themselves are involved in the community by any of the several ways. They are either attached in this domain just for being a promoter of the Open Source or maybe they want to enjoy the respect and the motivation earned by being associated with the same. Yet moving towards the domain of Open Source requires a lot of courage, especially for an industry like EDA, which calls for huge capital, it is quite a risk.

This paper follows a simple approach in which first the EDA industries are acquainted and then the trends in Open Source EDA are studied, taking primarily the financial status of the companies at each step.

II. MAJOR PLAYERS IN THE EDA MARKET-THE CURRENT STATUS

The market is witnessing the rise of the EDA industry at the tremendous pace. It has seen a remarkable growth of 7% to 9% per annum among the EDA industries in the last few years. Increased demand of investments was seen in semiconductor industry. In this discussion, a couple of big leaders, e.g., Synopsis, Cadence Design Systems, MentorGraphics, etc. are being considered to understand the EDA market [1].

i. Synopsis

The largest player in the EDA playground, the Synopsis, gave space to a lot of good performer houses under its umbrella. The boom for Synopsis could be realized from the fact that its revenues boosted up to \$330.2 millions, beating its own standards of \$328.8 million. This fact adds up to the proposed matter of the raining profits in the EDA sector, Fig.1.



Fig.1 Market Study-Synopsis

ii. Cadence Design Systems

While talking about Cadence, its revenue came out to be around \$220.3. Cadence is continuing to expand and upgrade its product portfolio in the design and verification space. It recently released Encounter Digital Implementation (EDI) System 9.1, which is an integrated digital design solution and this supports the implementation and verification environment for the development of large-scale and complex system-on-chips (SoCs) and improvement in designer productivity Fig.2.



Fig.2. Market Study-Cadence Design Systems

iii. Mentor Graphics

Mentor Graphics had the revenue collection of \$237.1 million, Fig.3. It extended its CatapultC Synthesis product to support the SystemC design language. The extension will allow designers a wider option of choices for system-level design. It also launched the Tessent Yield Insight product that will allow customers to use IC production fault data to help track and correct faults. The company also announced the acquisition of the Virtual Garage product line from Freescale, a U.S. technology company. The Virtual Garage software suite addresses "the trade-off between value-of-variety and cost-of-complexity caused by optional electronic content; and provision of vehicle-specific design data, such as dynamic electrical schematics" within the design and management of automotive electrical and electronic systems. Mentor believes that the software suite will help to expand its participation along the value chain by letting it into product planning and online service documentation. Both of these functions are critical to their delivering strong software support.

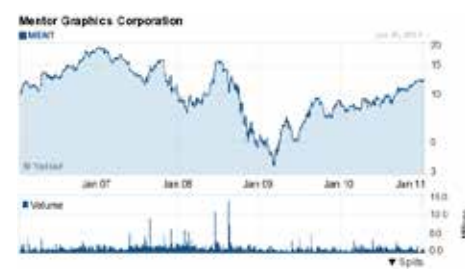


Fig.3. Market Study-MentorGraphics

iv. Magma

Magma also is doing quite well with the latest revenue of \$31 million, Fig.4. Magma recently launched Tekton, a new timing analysis platform that offers higher capacity and faster runtimes than traditional tools while maintaining accuracy. Tekton runs multi-scenario analysis on low-cost hardware without requiring a battalion of servers and software licenses, thus addressing complex sign-off challenges cost effectively. The company also released Silicon Smart ACE, a next-generation intellectual property characterization and modeling tool that leverages accelerated circuit engine (ACE) technology and embeds Magma's FineSim SPICE simulator. The solution is targeted for design at 28nm and smaller process nodes.



Fig.4. Market Study-Magma

This discussion shows the growth of EDA from the commercial perspective. One thing which can't be denied is the idea of involving Open Source in the development or rather says an easy flourish of this industry. Open Source has already shown its importance in many domains and now it won't be wrong to say that most of the companies are heading towards the Open Source seeking its benefits [2], especially for the hobbyist, and startups in the domain.

III. OPEN SOURCE EDA INDUSTRY – THE CURRENT SCENARIO

After having a look at the commercial performance of the major EDA players in the above section, let's now switch to the status of the Open Source EDA companies and their projects. This following short case study throws some light on their background, funding, major products from commercial point of view and similar other points.

i. Kickfire

Kickfire was founded in June 2006, in Santa Clara, Calif. The company offers analytics appliance based on MySQL and features the industry's first SQL chip. It also creates fast database query performance using MySQL database, by combining software and hardware. The SQL chip moves query processing to a single powerful chip and provide an improved version of MySQL in terms of data warehousing and reporting.

The Motivation - It was realized that the instruction-centric von Neumann architecture was inefficient for processing large data volumes and there was a need of minimizing the operation set and maximizing the data throughput. The solution was realized as having an open architecture which was available via MySQL.

Current Scenario - Kickfire presently is in its beta. Major interests have been shown by marketing, telecommunications and software service providers, network management, retail, media and government organizations.

Funding - As usual like every other open source company funding plays a crucial role. This company has got Series A funding of \$10.75 million and Series B at \$20 million, backed by Accel Partners, Greylock Partners, The Mayfield Fund and Pinnacle Ventures.

ii. gEDA project

It was started by Ales Hvezda in an effort to overcome the scarcity of the lack of free software EDA tools for Linux/UNIX. It's first software was released on April 1, 1998. It works on full GPL'd suite and requires a toolkit of Electronic Design Automation tools [3]. These tools are used for electrical circuit design, schematic capture, simulation, prototyping, and production.

The Motivation - Though the main aim behind the origin of this project was to provide a remedy for free softwares, the project also planned to write a PCB layout program and soon the ability to target netlists to PCB was quickly built into the gEDA Project's netlister. Meanwhile,

other open-source EDA programs were created at about the same time. The authors of those programs became affiliated with the gEDA website and mailing lists, and the collaborative gEDA Project was born.

Current Scenario - At present, the gEDA Project remains a federation of software tools developed by different (but sometimes overlapping) programmers. Currently, the gEDA project offers software applications for electronics design, including schematic capture, attribute management, bill of materials (BOM) generation, net listing, analog and digital simulation, and printed circuit board layout.

Funding - The project is still existing and serving its users too. It strives on the funding and the aid from its users and the interested applicants only. Also the founders of the project declare that the major reason behind the success of the project is that its users, who never compare it with the mainstream tools and do not want the tool to be enhanced in its functionality [4].

iii. KiCAD

KiCad is an open source software suite for electronic design automation, used in designing schematics of electronic circuits and printed circuit boards [2]. KiCad has been developed by Jean-Pierre Charras and Dick Hollenbeck, and it was first released in 1992 and features an integrated environment with schematic capture, bill of materials list, and PCB layout.

The Motivation - It was realized that the number of interfaces required for various stages of automation should be reduced and therefore work on such a tool was rooted. That's why compared to any other free software of similar kind, KiCad solves all stages with the same interface, namely, Schematic Capture, PCB layout, Gerber generation/visualization and library editing.

Current Scenario - KiCad is quite successful nowadays and is adapting according to the requirements of the users. This keeps it updated and in competition with its commercial counterparts. Now KiCad can be run on FreeBSD, Linux, Microsoft Windows and Mac OS X [5]. A lot of component libraries are also available. File formats are plain text and well documented, which is good for CVS or SVN and to make automated component generation scripts. Multiple languages are supported, such as English, Portuguese, Spanish, Czech, Polish, French, German, and Russian.

Funding - The communities and the groups using KiCad have taken the initiative to keep their useful tool get going.

The libraries are updated time to time by the users only and this again showcase the advantage of the tool being Open Sourced. Any individual development in the tool is reflected as the overall development [6].

iv. TinyCAD

It is an open source schematic capture program for MS Windows and was released on 29 October, 2010. It is an example of recent development work in the field of Open Source EDA. It attained its popularity because of the fact that although it's an Open Sourced tool yet it is for Windows that never can be Open Sourced. Motivation factor -The aim behind this was to create a tool that could match the present day requirements and at the same time capable of being running on the Windows platform rather than Open Source platforms like Linux. Now the tool is available for platforms like Win95, Win98, WinME, Windows2000, Windows2003, WinXP, Windows Vista [8]. Some of the recent features of TinyCAD are 'Drawing Overview', 'Web & Word', 'Create PCBs', and 'Simulate with Spice'. It can create circuit diagrams for display on the Web and in Word, turn circuit diagrams in to PNG images, convert drawings in to Acrobat (pdf) files, and simulate circuits with TinyCAD and Spice.

Current Scenario - TinyCAD is being widely used to produce professional circuit diagrams and export net list information to PCB applications. And now to showcase the tremendous rate of development the instance of its releases can be taken into consideration. Recent and very fast releases like TinyCAD 2.80.02.462, TinyCAD 2.80.00, TinyCAD 2.70.01, and earlier versions too show the interest that binds the users [7].

Funding - Since this tool is new to the market, it has been observed as a potential tool by its users and thus monetary considerations do not bother here. The tool is widely supported by its users and is surviving up to the expectations of the users.

While having the search for the Open Source EDA companies the question that comes to mind is 'Why is there a lack of usable open-source tools in the commercial EDA industry?' It can be figured out easily that Open Source is somehow being more in demand at the academic level as compared to the industrial worth. Broadly speaking all the best software tools in the world should be Open-Source and there should be a kind of collaboration that can be leveraged from all the smart brains the industry can offer.

IV. EDA INDUSTRY - THE SHY FACTOR

a) An Introduction

Let's find, why some of the EDA industries shy away from the Open Source? An obvious answer to this question is the challenge to be faced in the market. In the past, most of the companies were controlled by bigger players or were proprietary to them. This is also a well known fact that the increasing pressure of the effective costs to the companies and the tremendously increasing competition in the market are forcing many players to adopt the policy of sharing the resources, which is an Open Source pro. As for now, not only good hardware is required but at the same time flexible hardware building blocks also have equivalent demand, for creating a reliable and advanced generation solutions for the users.

It requires some will to contribute, by the company, for the Open Source community, which pays in the long run as the 'successes' in this domain. Take for instance, a huge player like Mentor Graphics is also committing to the Open Source [9]. The reason surely can't be self interest but obviously the idea of contributing its part in this widely growing and respected community. The company is contributing to the advancement of the 'embedded products running Linux'. This will surely help the developers who are targeting embedded Linux, as they are now getting the assistance in terms of tools and resources for working on their Operating System. At the same time, this act is helping in accelerating the growth of the Linux platform, and Linux foundation is a non-profit organization.

b) Advantages of Being Associated with Open Source - Case Study

Certainly, the next question comes that what type of gain is being achieved by taking these types of steps. Clearly, the answer lies in the basic fundamentals of the Open Source which guide the community by stating to work for the motivation rather than paying heed to earnings. Here, in the above mentioned instance too, the community is benefited and the company too, as the market value of the company in terms of its market shares and the reputation has been boosted up. So it can be figured out that it is a bidirectional process. To get the mutual advantages Open Source and the profit-making companies are collaborating.

Also the sharp minded developers present in the community are also getting chance to work with the big players. Surely working for the market leaders boosts up the satisfaction in both ways motivation and profit. Talking about the companies who have boldly acknowledged themselves as the Open Source companies and are working for the

same, the case study of Pandora can be quoted here [10]. It is not designed by a large company but it was designed by the suggestions and requests of hundreds of people on the gp32x forums [11]. These suggestions were fine tuned in to what the world sees today, a completely new open source handheld. Another interesting fact about the existence of the gadget is that it got its developers from the community only, among whom was some top designers and other worked on the drivers, operating systems and some software ports [2].

Designing involved a lot of money, which was quite more than that could be afforded by the developers and also the involvement of external big investors was against the principles of the Open Source. Hence the gadget acquired a unique strategy of advance payments. Keeping up to the expectations of the interested buyers and not to lead to any situation of mass cancellation was the biggest challenge faced by this company. Sheer dedication and the commitment paid off for them. Also to raise money for the community perpetual efforts are being made to raise donations or funds from the community members. This helps the developers and the associated members to taste the success on the commercial front too. Hence, such companies have proven the misconception of Open Source making profit at the commercial front wrong. There has been a continuous evolution in the developments whether we consider the hardware or the software. This keeps the product updated and alive in the interests of the users.

Considering the market scenario of the product the first batch of over 4000 units has got the fruits of success for the company just after their manufacturing. Timely invitations for placing orders are released for the buyers. This puts a size limitation on the production and thus saves the company from the tremendous losses to be faced under the unfavorable circumstances like cancellation of orders, technical errors in production, and other such troubles in software or hardware parts. The best thing about such companies is the Open Source characteristic like offering the source codes for the users and not hiding the details of the device [12].

CONCLUSIONS

The work kept focusing on the reason behind the booming financial stats of the EDA companies and also in the end showcased the next generation strategies being adopted by the fresh minds of the Open Source community. The myth that Open Source is far away from commercial benefits has been shattered now. Many of the renowned companies are either switching to or getting associated with this domain. Similar cases have also been quoted above. It is expected that throwing some light on these upcoming trends will certainly enhance the strategies and thereby the productivities among the EDA industry. At the same time the blossoming companies may adopt few key points from the formers to carve their names in this field.

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