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Brazil

Trends and status in chip design and EDA

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I. INTRODUCTION

Brazil is a presidential republic with a stable democracy and is officially named as the Federative Republic of Brazil, is the largest country in both South America and the Latin America region. It is the world's fifth largest country, both by geographical area and by population. It is the largest Portuguese speaking country in the world, and the only one in the Americas. Brazil is one of the strongest democracies of South America. Politically stable, the country is now the 6th largest economy aiming to be 5th by 2015, with a strong and modern financial system.

With a population of over 195 million people, Brazil is a huge end-user market for semiconductors and chips. A fast expanding 100-million-strong middle class avid for new technology and with increasing purchase power have created a dynamic market for consumer electronics, mobile phones, computers and vehicles. Additional to the strong internal market, the country has an abundance of natural resources that lead the technological mastery and its entrepreneurial capacity in renewable energies and in the oil and gas chains, for example.

The Brazil central geographical location and its strong economic position make the country as an effective gateway to other markets in South America, the Caribbean and Africa. Brazil currently exports over US$45 billion in goods to other countries in South America, and is an ideal regional hub to all of Latin America.

The Brazil gross domestic product (GDP) growth will be driven by an expanding middle class, government investment, as well as investments for the 2014 World Cup and 2016 Olympics.

II. CHIP DESIGN AND EDA PRESENCE

The scenario of Brazilian Companies making business in the semiconductor chain can be divided mainly into three main areas: packaging, foundry facility and IC design. Due to strong internal market there are several companies making the backend process for memory modules and smart cards. Back in the eighties a company called Heliodinamica started the production of mono- and poly-crystalline silicon for solar cells. In 2008, a public company called CEITEC S.A. was created by the government to continue the effort to have a foundry facility in Brazil which will be in full production by 2014. It also has been announced another foundry facility called SIX, a joint venture of local company and IBM.

From the perspective of IC Design companies, Freescale has one of its IC development centers located in the region o Campinas, SP, which started its operation in late nineties. Seeking for bringing the innovation endurance supported by IC design technology huge investments have been done to populate our country with design houses operations, since the beginning of 2000. Along these years, almost twenty Design Houses were created with working focus in a broad range of products, services and intellectual property (IP).

Due to a presence of strong microelectronics research groups in some Universities, they acted as inductors to establish around those Centers design houses operations like CEITEC near UFRGS (Federal University of Rio Grande do Sul) in Porto Alegre, SMDH near UFSM (Federal University of Santa Mario) in Santa Maria or LSITec near USP (University of Sao Paulo), as a few examples. Another group of design houses were built inside of Science and Technology Institutes like CTI (Centro de Tecnlogia da Informacao Renato Archer) and Eldorado Institute in Campinas or CETENE (Technological Center of Northeast) in Recife. It also came up some spinoff like Chipus which focus on mixed signal

Capital	Brasília, DF
Largest city	São Paulo, SP
L**anguage**	Portuguese (*de facto*)
Area Total	8,514,877 km²
Population (2012 estimate)	196.700.000
Currency	Brazil Real (R$)
Time zone	**(UTC -3)**
Internet TLD	.br

services and IPs.

The range of projects and products of Brazilian design house are on solutions for RFID, control and automation, telecommunication, intellectual property building blocks (digital, mixed signal and RF IP), etc.

III. ACADEMIA

Brazil has a creative, entrepreneurial workforce with a strong background in science and innovation with more than 25 Universities with Microelectronics research activities ranging from fundamental material science and electronic material processing passing through basic electronic devices modeling to IC design methodology and EDA algorithm development. Those R&D groups support many Universities Graduate programs to provide training and studies for more 280 ongoing MSc and PhD on field of semiconductor and microelectronics. Most of those groups have a strong International cooperation network.

There are three main active nationwide actions to promote cooperation between Universities and or R&D Centers to provide professional training and innovation on microelectronics: NAMITEC, IP Brazil and SIBRATEC.

NAMITEC project promotes the cooperation between different academic research groups around the Country with the main goals on: SoC for wireless sensor network systems architectures, low power IC design and test tools and methodology, fault tolerance, devices fabrication, MEMS and photonics.

The IP Brazil program is essentially a scholarship program for undergraduate and graduate students to promote training on IP cores design using an industrial like design methodology. The main focus is to reach undergrad students.

The SIBRATEC Program is intended to promote research, development and innovation through joint work between research groups from Universities and Science and Technology Centers with industrial companies. There is a board that evaluates industrial proposals and the accepted ones receive funding from the government to move ahead.

The biggest program for training professional on IC design is the IC Brazil Training Program. It was started in 2008 with a partnership and support from Cadence to develop an international class IC design training curricula on designing digital IC, analog and mixed signals IC and radio frequency IC. To support this program it was created to Training Centers (TC), one at UFRGS (TC#1) and the other one at CTI (TC#2). Both TCs were equipped with international class infrastructure to emulate an IC design commercial environment with 180 simultaneous training seats available. The training duration is almost one year inside the TC and can be extended for an additional year for in company training. During the two years the trainees can receive a government scholarship. The Program has already trained around 600 professional and it has almost 100 under training. The TCs also had made additional partnerships with companies like: MunEDA, ARM and Agilent.

Brazilian Universities have access to an extensive support program on tools academic licenses. They can access to Cadence, Mentor, Synopsys, Agilent, Silvaco (TCAD), among others.

IV. GOVERNMENT PROGRAMS

The Government is promoting the developing of IC industry using law instruments like tax exemptions and incentives for products that incorporate design and innovation done in Brazil. Complementary, Government has created many funding mechanism seeking the IC design promotion from the following main agencies: National Council for Research (CNPq), National Studies and Projects Financing Company (FINEP) and National Development Bank (BNDES).

Strong funding systems through BNDES and FINEP have been put into place for companies seeking capital for productive investment in semiconductors.

Dozens of education, training and R&D programs have been launched in the last five years to accelerate the size and potential of the workforce needed for future technology projects, as mention before.

In 2011 and 2012, the FINEP invested over US$450 million in credit to private and public R&D centers in the engineering and Information Communication Technology (ICT) sectors.

Government programs invested US$100 million in R&D centers, parks and incubators, creating over 5,000 new innovative companies in all industry sectors.

The Science Without Frontiers Program, of which 75% is publically funded, promotes knowledge exchange in several areas through internships and training all over world. Over 100,000 scholarships are planned through 2014.

V. REFERENCES

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Eric Ericson Fabris - PhD, Professor at Federal University of Rio Grande do Sul (UFRGS), CEO of CEITEC Association. Professor Eric background and R&D interest are in the field of AMS-RF IC Design. He is (CTO) of the Training Centers for IC design engineers training, one of the HRD initiatives under the nationwide IC Brazil Program. He is also the CEITEC Association CEO, one of the IC Brazil Program anchors Institutions. Recently, Eric was appointed as SBMIicro President, the Brazilian Society of Microelectronics.