



## **Oral History of Lip-Bu Tan**

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**Kapoor:** On behalf of the Computer History Museum, I'd like to welcome Lip-Bu Tan for his oral history interview. Joining me is Doug Fairbairn who is also a colleague here. Lip-Bu Tan is Founder and Chairman of Walden International, a leading venture capital firm managing cumulative capital commitments of 2.8 billion dollars. He concurrently serves as Chief Executive Officer of Cadence Design Systems and has been a member of the Cadence Board of Directors since 2004. Born on November 12th, 1959 in Malaysia, Lip-Bu received his BS from Nanyang University in Singapore, his MS in nuclear engineering from MIT and his MBA from the University of San Francisco. Lip-Bu has been named one of the top ten venture capitalists in China by Zero2 IPO [ph?] and was listed as one of the top 50 venture capitalists on the Forbes Midas List, he was a recipient of GSA's 2016 Dr. Morris Chang's Exemplary Leadership Award and in 2017 he was ranked number one, the most well connected executives in the technology industry by the Analytics firm Relationship Science. So with that, welcome Lip-Bu.

**Tan:** Thank you.

**Kapoor:** Let's start with your early life, of course you were born in Malaysia, I understand that you were schooled, was it in Singapore or was it in Malaysia, can you tell us...

**Tan:** In Singapore.

**Kapoor:** And tell us about your early life, how many siblings you have, what did your parents do and all that?

**Tan:** Sure. So my dad and my mom both passed away a couple of years ago and my dad is a chief editor of the largest newspaper in Malaysia and then my mom is working at the faculty at Singapore Nanyang University, that's where I did my undergrad and my brother, my sister also did that. So I born in Johor, Malaysia, 1959 as you correctly point out, and I have three sisters, older sisters and then one older brother and so we have a family of five. And then later my mom moved to Singapore to work in the Singapore Nanyang University and then she took my oldest sister and myself to Singapore first and later on my other siblings joined us in Singapore. ...My brother is a Rhodes Scholar and a medical engineering PhD and later on he become a heart specialist and then putting artificial heart to save lives in the U.K. And my oldest sister is a marine biologist and working in Singapore at that time. And then my second sister is a PhD from Harvard working at Dana-Farber as a professor at Harvard University. And then my third sister closer to me, she's in linguistics and she can speak 16 different languages so I'm kind of a drop out guy and so the four of them, they can perform piano and violin in the performance concerts and one is a music composer. ...I'm kind of drop out, supposed to finish a PhD and first of all, undergrad and my professor always tell me that, "You are great but your brother is better." And so I said, "Well, I've got to take a different path than my brother, I don't want to ever mess you up [ph?]." And so instead of going to the medical field, I changed it to something different. So I decided my undergrad is physics, quantum physics, that's very good training and so I finished my undergrad in three years, so somehow I'm a very impatient person so I finished in three years. And I mentioned earlier, my brother and sisters, they are all great musicians, but the youngest one, my mom got tired and then I love basketball, volleyball and then catching spiders. After the great tour of the music, I drop out and not quite my style but later on I pick up

and later on I'll share with you, I'm more than seven years or eight years at the San Francisco Opera Board Member and until I become a CEO of Cadence, it's just difficult to come to San Francisco for board meetings so I stepped down as a board [member]-- but I'm still a season ticket [holder] and enjoy the opera a lot even though I cannot play any instruments but I enjoy music. And long story short, I decided to pursue nuclear engineering after my undergrad in physics from Nanyang University and I thought that time, the energy crisis is bigger and so even though I accepted in other university for EE computer science, but I thought energy is a big problem so I decided to enroll into nuclear engineering. And so I was supposed to be in a PhD program [but] the nuclear Three Island accident happened. ...One day it was pouring rain and I was in the placement office, the director of placement office was just chitchatting with me, he said, "Which department you are from?" and I said, "Nuclear Engineering Department, I'm in the PhD program." And he said, "Oh, get out of that field, there's no future in U.S." So I took his advice, I said, "Oh well, where should I go?" And he said, "Well you should apply to this company called EDS Nuclear in San Francisco." So I say, "Okay, why don't you arrange for me to have interview?" and I interview here and then they give me a job and it's a beautiful city here, I fall in love with San Francisco. And so I decided to tell my professor, "You know what, I should finish my master's and not pursue PhD." He said, "Well you have all the grant," in fact I helped him wrote the research program from EPRI and he said, "Well, why you want to quit a PhD?" I said, "There's no future, I've got to move on." And so I did, I came over here and then working for EDS Nuclear then later on become big client of Vector [ph?]. Then I was at that time was quite young, you know, 19 years old and then they have a challenge in term of some of the design and so [even though I was just a] young kid I said, "Oh well, I can help, I'm very good in the statistics and I can look at all the drawing and I see whether I can prove that our design is correct." And then the president CEO kind of took a liking on me and he said, "Okay, who are you?" And then so they give me this project and I work on it, I show the standard deviation and then saved the company and the design is accurate, very small percentage of error. And he asked me, "Where do you want to work?" and I say, "I'd like to rotate in the company," so they did the rotation for me and eventually I work in his office as a kind of chief of staff. And later on, a couple of division managers asking me to join them and so I said well, I'm only 21, 22 years old, nothing to lose, so I joined them and then...

**Fairbairn:** I'm sorry, you joined...

**Tan:** EDS, this new company called ECHO Energy Consulting that they're starting the company and so I joined them and they said, "Well Lip-Bu, you can work from home and this is a tool textbook and then you develop the code and you benchmark it." And so I did, I developed that code and then I benchmark it and then they used that tool to providing the business and then...

**Fairbairn:** So tell me more about that, what was the purpose of the code and...

**Tan:** So the code is basically doing what's called water hammer effect. So for example in the piping, in nuclear piping because of earthquake, seismic, and temperature and then a certain point in time, the pipe break and then you're starting to see how the pipe will swing and then will affect other places so it's a simulation software and for piping analysis using the water hammer effect. And so I did that and then when I finished the code, they are starting to sell in the marketplace and they kind of turned to me and said, " Well Lip-Bu, you're the youngest among four of us, we are founder and so by default, you have to

be the CFO." And I said, "What do CFO do?" And he said, "Well, just balance the books." And I said, "What books do you balance?" He said, "Don't worry about it, we'll send you to USF, study your MBA part time and you balance the books." And that's what I did for two and a half years.

**Fairbairn:** So this was a startup that you had joined...

**Tan:** Yes.

**Fairbairn:** ...this was a very small company.

**Tan:** Small company.

**Fairbairn:** And why did you choose that over the company that you were with earlier, what made you want to make the move?

**Tan:** Somehow I kind of having fun being an entrepreneur, spirit [ph?], small company can do things and I kind of [had] nothing to lose [at my] young age and I might as well try it and long story short, that's the beginning of this entrepreneurship and VC.

**Fairbairn:** So had that been a goal of yours early on or is that just an opportunity to...

**Tan:** Opportunity.

**Fairbairn:** Just came about and sounded exciting.

**Tan:** Right, and in fact, and I should bring up the topics, when I was at MIT, I really liked that nuclear simulation reactor rod simulation for nuclear power plant and unfortunately professor don't take me as a student but I like to do a PhD with him but he refused to give the scholarship. And so the dean, Professor Todress [ph?], I'll always remember him, he kind of took pity on me because my mom only send me one weekly kit and then one semester tuition and the rest I had to survive. And to be candid with you, I've come from the Chinese Mandarin speaking university and a little bit of background, my mom put my brother and sister in the English school so they speak fluent English and then for the youngest one, they said, "You know what, we should have this younger one learn some Mandarin and Confucius theory." So I did. And so my language is not that good so when I came to MIT, the first semester is really tough, I don't even understanding what the professor is talking because they have a very strong American accent and I don't understand what they are talking so I just survive. And then secondly for nuclear engineering and I tried to derive every equation because I'm a physics major, undergrad and I was having a hard time, every equation tried to derive it. Finally one of the friend of mine, a student said, "You just apply, you don't even have to derive that equation, we don't do that." So finally it's kind of like <inaudible 00:12:27>.

<overlapping conversation>

**Fairbairn:** Start doing engineering, right?

**Tan:** Start doing engineering and I survive and then the...

**Kapoor:** From a language standpoint and Singapore is an English domain, right, so you would have known English.

<overlapping conversation>

**Tan:** Yeah, but Mandarin class. So high school is in the Chinese High so my English is not that good and in fact, my mom was very apologetic that send me to Mandarin school so my English is kind of broken English. Anyway, I survive and then the long story short, on the dean who took pity on me so he said, "You know what, you're pretty good in mathematics so why don't you work for me. And so long story short, I finished that but the Three Mile Island accident happened and so I moved on to work at the ECHO Energy.

**Fairbairn:** But you're still working in nuclear energy in the beginning, right?

**Tan:** Yes. So I did that and then I finished my MBA from USF, and then another interesting thing because the work is very busy as a startup as you know and so I recruit my wife to take the MBA same time with me, so she is full time and I am part time but we finish the same time so I just take his exercise from my work so I survive the MBA and then we graduate together. And then so I kind of start, that's where my CFO background, my finance background.

**Kapoor:** So then I noticed that you were VP at Chappell & Company, can you tell us, what was that?

**Tan:** Yeah, Chappell is very interesting, in my last class at MBA, they invite a speaker that is a senior partner at Chappell & Company actually owned by Guardmore [ph?], London, and Steve is his name, he giving a speech about the financing startup company. So I asked a lot of tough questions and he invite me for lunch, I say, "Uh-oh, that is a payoff time," and surprisingly he said, "Well Lip-Bu, we want to have you work with us because we look at your background, you seem like very technical, understanding technology and we receive a bunch of business plan every week and we are all from financial background so we would love to have somebody help evaluating that business plan." So that's kind of my beginning of reading 1,000 business plans.

**Fairbairn:** What was the name of his company?

**Tan:** Chappell & Company.

**Fairbairn:** Chappell & Company, okay.

**Tan:** And so I starting one day helping evaluating the business plan to two day and then eventually ECHO Energy was sold and I finished my MBA so I work at kind of Assistant VP at the Chappell & Company.

**Fairbairn:** So what was their focus, what kind of businesses were they interested in funding and tell me a little bit about that company?

**Tan:** Yeah, they are kind of investment banking firm, try to do venture capital investment. So basically when the entrepreneur come if they decided to fund they will help them to raise money and then they charge a fee for it and that's how I got started. So ...after five days, they put me in charge of private placement so I'm in charge of all the selecting and recommending which company to invest and then will syndicate, they don't have a fund, so they will syndicate the investor to bring the money in and then eventually Guardmore will put the fund together. And so they asked me to be a partner to do that but I cannot decide at that time, they are more investment banker rather than... I want to see them become successful before I move onto the next projects.

**Fairbairn:** So how old were you when you started working with Chappell, just informally?

**Tan:** I think it's about, ECHO Energy and—initially I work at EDDS Nuclear then I start ECHO Energy with a couple of founders and then I become at Chappell & Company, I would say it's about six years after I came out from college, graduate school.

**Fairbairn:** So you're still in your mid 20s, or...

**Tan:** Mid 20s, yeah, still quite young.

**Kapoor:** So this is about what time frame, 19...

**Tan:** ...I finished my graduate school at '81 and so I would say when I joined Chappell & Company, I would say in the '85, '86 time frame.

**Kapoor:** Because I see you founded Walden in 1987.

**Tan:** That's right.

**Kapoor:** So that means this was the initiation of the...

**Tan:** Yeah, one year and a half at the Chappell & Company.

**Fairbairn:** So it was the desire to sort of have a different approach and be closer to the companies, work with the companies that you help fund.

**Tan:** Yes. Then after that, I felt that it's more important to get into the VC business. It's not easy and as you know, trying to get into VC business is not easy, so through multiple friends, I was introduced to about five venture firms and after that, I liked Walden Capital. It's two partners, Art Berliner and George Sarlo, they are very good and they are SPIC program, small [ph?] fund and somehow they liked me. And I also kind of proposed to them, "You don't have to pay me the salary and I will raise a fund." And

actually Walden International, the first fund I raised is 3.3 million and that includes my father-in-law, finally I got married, my father-in-law and a couple of my father's old friend in Malaysia and put money. So my first fund is 3.3 million, so a very humble start and then Walden International, right now we manage 2.8 billion, almost 3 billion.

**Fairbairn:** When you first started there, what types of companies were you interested in investing, what areas of expertise and technology focus?

**Tan:** Yeah, so I had been very much like the technology area so I enjoy working in, so my first investment actually is Mouse Systems, some of you may be familiar is the computer mouse and so it's kind of a safe investment, they're doing single-digit revenue, million dollars revenue and then I invest in, I thought as a kind of safe investment. Steve Kirsch, I think you may know Steve Kirsch, he's the founder of that.

**Fairbairn:** Yeah, we've interviewed him.

**Tan:** Oh you interviewed him.

**Fairbairn:** Yeah.

**Tan:** He's a wonderful man and very successful entrepreneur. And later on, for whatever reason they want to bring in the CEO, Dickinson [ph?] and some of you may know and then he become the a CEO. Before that, there's a time that they don't have a CEO, so I have six month as an interim CEO, so I saw my first taste of, you know, when you make investments, sometimes you have to prepare to step in and then to help the company. So eventually the company was sold to KYE in Taiwan and then Walden become an investor in KYE in addition to the company sold to, Mouse Systems sold to KYE but also we put additional money to KYE. KYE went public and so I make money twice on the Mouse Systems to KYE and then KYE went public and we make money on that. So that is kind of enjoying that kind of entrepreneur and then to the VC side. And then the VC side, from 3.3 million that I helped started investing and that fund done very well and then over time we kind of... And then the other thing is my mom lived in Singapore at that time, I am very dear to my mom and so everybody asking me, Walden International that we have a footprint in Asia-Pacific and then how do I do that, do I have a master plan to do that? Actually, to be candid with you, it's just an excuse for me to visit my mom. And so I set up enough, I'm almost the first venture fund in all these Asian country, I kind of bring the venture capital concept to the Asia side, so I putting up, initially I started in Taiwan and then I set up in Singapore, set up in Malaysia, Indonesia, Philippines, and China, and so pretty much all the Asian country, I put the first venture fund and educating investor. And sometimes it's very hard to explain to the Asian investor, "You put the money with me, I'm not charging three percent management fee and then if we make money, I'll return the capital with 20 percent profit sharing but we don't share losses." That is unheard of. But that concept eventually take off in China, in Asia, in Singapore, and that's how I got started.

**Fairbairn:** Did you hire local people in each of the areas to look for investments? So you had representatives in each of these countries?

**Tan:** Yeah, so I have this philosophy, think globally and act locally, so what I did is every fund I put together in the country, I will track the investor locally, either it's a bank, insurance, like the Singapore, the three largest bank is my investor and then the government in to be my investor and also the insurance AIG, used to be my investors.

**Fairbairn:** So you raised money in each of the areas and did you then invest that money in that area?

**Tan:** In that country.

**Fairbairn:** And you had partners that you hired to watch out for the opportunities and so forth?

**Tan:** Yes, so I recruit the talent and there's no VC background in some of these Asian countries so I had to recruit the people to convince them and educate them, train them, and they become my partners and so that's kind of the story.

**Kapoor:** So I understand that Walden was named after Thoreau's *Walden* and there was a theme of being contrarian. So was there a contrarian aspect of investment as well?

**Tan:** Very much so, and so over the period of time, we invest in technology and we invest, initially I invest in any technology and then last 15 years, I focus on semiconductor while everybody thinks that is a sunset industry and I decided to triple down on semiconductor and so we have been doing very well in the semiconductor startup in U.S. and Asia-Pacific. ...I felt that semiconductor is foundation of any electronic industry and all the killer app without the real foundation of the silicon, it would not be functioning well. And it turned out to be true and initially I was questioned by many of my investor, "While most of the venture firm U.S. are not investing in semiconductor, why on earth you going backward?" And now they're starting to recognize my strategy work and strategy I'm excited about the semiconductor opportunity and right now even more so.

**Fairbairn:** So what were some of the early companies that you invested in semiconductors?

**Tan:** Yeah, so I invest quite a lot and invest in S3 and that is the graphic company that went public successfully. And then I invest in the Creative Technology in Singapore, they are, if you remember the bringing the sound to the computer, this is the SoundBlaster and then Sega [ph?] was very proud that I help him to become the first Singapore company to be listed in NASDAQ and so helping them really successful in doing that, and so many, many others. And in Taiwan, I helped started the D-Link [ph?] and then also GVC, the largest modem company and so many more, I am happy to talk more.

**Kapoor:** So how did the relationship with Cadence begin, I mean you were an investor but were you also in parallel looking at your own career as an executive?

**Tan:** Yeah, it's a very... you know, again back to my point earlier, my dean at MIT, before I graduate and asked him whether he have a parting advice for me, his advice is very good, he basically told me that, "Keep your eye opens to take calculated risk," and I treasure that throughout my life. And so when I was



in the EDS Nuclear and when four people approached me to do this startup, again, I take calculated risk and I jumped into this startup and learned a lot from that. And then same thing from startup and when the opportunity come to be an investment banker, I jumped on it and so I succeed on doing that and later on I decided to be a venture capitalist. Again, I take a calculated risk joining Walden Capital and I helped start up the Walden International as of today as the chairman. And then 2004, and actually before that, I have two opportunity, one I was approached by Michael Marks, that time he was CEO of Flextronics, he asked me to join Flextronics Board and then I was struggling whether I should join public board but he said, "Well none of my board understands Asia and I need someone that understands Asia and you should join the board." And so I did, and I learned a lot from him on the Flextronics Board for nine years and then in, 2004, Ray Bingham at that time was the CEO of Cadence, he approached me to join Cadence Board and initially I said no and I'm not going to join Cadence Board but he's very persistent and the board is very persistent, asked me to join the board and in 2004, I joined Cadence Board and that's my journey with Cadence.

**Kapoor:** Then Mike Fister era was quite a turbulent one. Unless you have another question.

**Fairbairn:** No, I was wondering, what was the state of Cadence at the time and sort of tell us about how you worked through that and eventually became CEO?

**Tan:** So I was recruited to join the board so I joined the board and I fully enjoyed the board and the board meeting and also there is a board member called Alberto and he's the founder of...

**Fairbairn:** Alberto Sangiovanni-Vincentelli.

**Tan:** Al Sangiovanni, a professor at Berkeley and he somehow recruit me to join the Technology Committee at Cadence so I went to his house many times and he's a very good cook, Italian cook.

**Fairbairn:** I was about to say, did he make you dinner?

**Tan:** Oh yes, lunch and dinner and then he took me to the Cadence Lab and learn a lot about the system, abstraction from the EDA.

**Fairbairn:** The Cadence Lab at Berkeley?

**Tan:** That's right. And so that's kind of my journey with Cadence. And then 2008, I was sending my oldest son to Carnegie Mellon school for his study and just put him in the dorm, the phone ring from John Shoven, Chairman of Cadence and he want me to be interim CEO of Cadence, my answer is no. And so again, they are very persuasive and it took a while after I came back and so finally I agreed to do three months and so I said, "I will do three months interim CEO and then you guys should do a search and find the best person and I can just go back to my Walden activities."

**Kapoor:** So this is the time when Mike Fister was leaving Cadence.

**Tan:** Yes, at the lab and also all the key executive left also if you recall, it's kind of a dark Monday, you know, five executive VP all gone. So I become the interim CEO and I really focus on... and my passion is really focused on the engineering, in the R&D and then understanding [the] platform. I visiting more than 1,500 customers to listen to the customer what went wrong. And then so it's a journey of three months and then helping to do what is right for the company and then while they're doing the CEO search.

**Kapoor:** I still remember, I was one of the people that came and gave feedback to Cadence.

**Tan:** Yeah, thank you, at that time you gave me very honest feedback and I took it to heart, thank you so much.

**Fairbairn:** So what were the things that you found wrong, what are the changes that you implemented during that time?

**Tan:** You know, that is my first time CEO and I still remember my global human resources gave me three books, "How to be a CEO" and I read every page of it and so a couple of things I kind of focused on, one I used to play basketball and volleyball in college team and I always believed in "one team" culture. So the company's quite dysfunctional, a lot of silos and I tried to change it to a one team culture that we can work as one team, so that's one big thing that I focused on and still today, I am still focused on. And then secondly, it's very important to listen to the customer and then I put the customer focus as the number one priority, so make sure that we are very focused on delighting the customer, and so that's very important. And then thirdly, I put my VC training to work and then if you are behind, you have to leapfrog [ph?] and you recruit the best talent and make sure that you have a plan to leapfrog and change the design to be better. So [to] look back, you know, we focused on a couple of things and initially focused on parallelism and then massive parallelism so that we... that culture of innovation is very important, the culture of innovation, every year we have like seven or eight new products organically developed and so right now [in the] last three years we have like 25 new products organically developed. And so initially we focus on parallelism and then lately we have been very focused on using machine learning, deep learning into our tools and make it more productive, the PPA and runtime improved substantially. And then lastly, we also put a big effort into the cloud and so you just saw that at DAC [Design Automation Conference 2018] [ph?]. I announced with Microsoft, Amazon, and Google to put our tools and IP in the cloud and that is the customer-managed cloud and it's different from the Cadence-managed cloud. So this is a big step for us to do to optimize to the cloud environment, cloud native environment. So something that we, I kind of put in place to focus on innovation, focus on customer success, and focus on one team, focus on inclusive culture, that we want to bring in diversity to the company.

**Fairbairn:** So you only signed up for three months, what happened in that three months? You then decided to continue.

**Tan:** Yeah. So, after three months, and they stopped the search. And they said, "You're valuable, and you should continue." And so that [how] is my three-month commitment become, October, coming up to 10 years at Cadence. And so look back, I think we really delivered the shareholder result. I still remember when I took over our share's like \$2.42 per shares, and now it's like \$46 per shares. Shareholder is, I

think, very important for me. I focus on shareholder return, shareholder value, customer success, and then pay attention to the employees. And I listen to employees. I have frequent roundtable, and a frequent reach-out. And I still remember when I become the interim CEO, I kind of promise to the employees: I am a first-time CEO, I like to listen to your advice, and feel free to send me email. I receive, every day, about 300 emails. And I respond each one of them. And some of them, I follow up with meeting. And they were shocked. And some of them say, "Well, we have been at the company for 25 years. The CEO never return our email. And secondly, never have a chance to meet the CEO." And I went to the cubicle and see them, and they were happily surprised that I'm willing to listen. So I think the culture we have at Cadence is stay humble, work hard, and delight the customer. And that's the culture.

**Kapoor:** And you also had some very key acquisitions.

**Tan:** Yes, we did.

**Kapoor:** Denali and some others?

**Tan:** For the... for the 10 years I was involved with the company as the CEO, we spent about \$1.3 billion, and with more than 15 acquisitions. And so, Denali is a good acquisition, for us to move into IP business. And, by now, IP is about 12% of our revenue. We also bought Tensilica, is a great IP and for AI machine learning. We're excited about that acquisition. We also bought some of the key acquisition to drive our tool improvement, you know? So those are the few good acquisition we did. And the latest one is Rocketick, is accelerations that can help our simulation, you know, verification engine, and now become Xcelium, our new simulation tool. So that's something that we continue to do acquisition, not just for the sake of acquisition for revenue, but really try to improve our product, and to delight the customers.

**Fairbairn:** So what changed your mind? You started out, I'm going to do this for three months. And then, how far into those three months did you start to realize, oh, I might really want to stay in this position?

**Tan:** Yeah. I think it's... it's kind of... you feel the responsibility for the industry, you know? And many people know, I came to Cadence for three reasons. One is for the employee, and number two, for the shareholders. And then number three, for the industry. And I like to see a vibrant semiconductor industry. And so, something that I feel very passionate about, and that's why it kept me going. And I had to drive. I live in Piedmont, I had to drive, every day, to Santa Clara, and every day, for the last 10 years. And so something that I... if it's not a calling, you won't do that. And I feel a very strong calling for those three reasons. For the industry, for the company shareholders, and also for the employees. And that's something that is a calling, that I do. And then, the other part... on the semiconductor industry contribution, you know, last 15 years, you know, I drive semiconductor at Cadence... At Walden Investment, and I'm very happy Walden [has] done well, you know, even though I am a CEO of Cadence. And we just celebrate our 105<sup>th</sup> IPO. And so... and now, we have the more recent IPO, Quantenna, is the wifi semiconductor company. Aquantia that's a 10G Ethernet switch semiconductor company. And I'm delighted. And we... the number 105 is made [ph?] one. This is the largest on-demand platform in China, and we are delighted that it will be our 105<sup>th</sup> IPO, at market cap of \$50 billion, and we are early investor. We are very happy with that.

**Fairbairn:** So how do you split your time between Cadence and Walden? What's your continuing role and time commitment at Walden?

**Tan:** Yep, and now I have two full-time job, that's why my schedule always very tight. I only need about four, five hours of sleep. So the rest of the time, you know, pretty much, I working on both. And, you know, Cadence have been doing well, and continue to serve the industry. And Walden have been investing in the many, you know, the exciting technology. And lately, I've been very focused on the six areas that are the big driver for semiconductor growth. 5G, especially in the RF area, AI machine learning, and in Walden, we invest about 30-plus startup in the AI machine learning area. And then neuromorphics, like brain, you know, low-power, your process, and your wake-up process, and your go back to sleep... can replacing battery. This is huge for industrial IoT. And the other part I'm heavily investing is the data center in \_cloud\_\_\_\_\_ infrastructure, because more and more scale out to the network and the storage. And also, some of the fundamental changes, in terms of for technology, to drive that. And then, the other part is autonomous driving, all the different sensor, lidar, radar, and then all the ADAS design. And so, from Cadence and Walden, we are supporting some of these new development. And then, finally, in some of the new material, rather than just CMOS [ph?]. And clearly, gallium nitride over silicon, indium phosphide, and then carbon nanotube. So I'm heavily investing in some of this new technology. And some of the Walden investment technology, also helpful for me to understand what the customer needs from the tool and IP that enhance the Cadence strategy in term of road map and directions.

**Fairbairn:** I was going to ask you, it seems that there is likely a lot of synergy between your investing activity and your Cadence activity. Is that... do you find that to be true?

**Tan:** Very much so. I think it kind of goes hand in hand, helping the industry, and also, it's good for me for education. I never stop learning. And so I'm always good to learn some new things, new technology, and how to apply and to design better products for the industry, for our next generation to enjoy. And so they are very impatient, our... you know, my two boys are very impatient with technology. And so I try to serve them with a better technology, better tool, better investment, to help them to fulfill some of their desire in term of innovation.

**Kapoor:** So in terms of... in the EDA domain, there were always three bigs, you know? Synopsys, Cadence, and Mentor. Mentor, of course, was acquired by Siemens. How has that affected the dynamics and strategies, from your standpoint, if at all?

**Tan:** Yeah. I think it's a very healthy industry. You know, clearly, a lot of respect for my competitor. Wally is a good friend of mine, and he done a fabulous job [with] Mentor, and then now part of a much bigger platform in Siemens, and that is very exciting, that ECAD/MCAD integration, I think, is a breakthrough, and I'm very happy for Wally. And, of course, a lot of respect for Aart [ph?] and Chi-Foon [ph?]. Chi-Foon is a very dear friend of mine, and they've done a very good job, and they're really good at execution. A lot of respect for them. They've done a great job on that. And at Cadence, we have our role. We had to live up to our expectation, to help the industry. So I think it's a very healthy industry. And then, consolidation and continue the innovation is what the industry need, and I think it's very exciting, to support a lot of work

in the innovation needed. And so we are kind of EDA IP provider, and also, Walden, the capital provider, to help some of this new innovation for the next generation to enjoy.

**Fairbairn:** So does Walden continue to raise funds in these individual countries? And is any of the operational nature of Walden changed over the last 10 or 20 years?

**Tan:** Yeah, a couple of changes at Walden. And so, beside the country investment, they focus on platform development. And so, you know, we decided to do kind of two bell... the bell approach, and couple of our funds are very early stage, even in the incubating stage. So we want to be even more impactful, by doing very early... when I say early, it's like two or three people with the idea, with our business primary invest. And then we also decided to have a PE firm, private equity, so that we can continue support a company in their growth stage. And so, you know, that's something that we like to do, able to support them, and also, even they go IPO, I will stay on the board to help them. And that's where they need it most, you know, to graduate to a public company. How to set the expectation, how to continue to drive the innovation, and the performing key measurement on the results. And so those are the things that we continue to be a coach and advisor and sit on the board to helping them to be a better public company.

**Kapoor:** So Cadence is organized in four business units, and with the new technologies that are coming, will you continue to focus on the four business units, or will that create some additional strategies?

**Tan:** Yeah, good question. So we have this new strategy that had been implementing last few years, we call it System Design Enablement. And so we call it SDE. And what it really mean is, now, first of all, we have to really build a strong foundation in EDA, and as our core business. And our philosophy is, every product, every tool, we have to be best of class. And so we continue to do innovation, driving the performance. And what I mentioned earlier, from massive parallelism to AI machine learning to the cloud and beyond. And then, secondly, we also building up the IP business, and IP is very important. It's kind of like the building block for the system design. And so, in a way, you want to make sure that all the key IP are available in helping the designer to put it together, like a Lego. To build together, silicon, we call it SoC system design, and silicon. Then, the next thing we also move on is the... beside the EDA side, we're starting to move on to the subsystem, the PCB, the system, you know, the integrity analysis, and then all the way to the system modeling related area. And so that we can be providing the solution for some of the vertical that we targeted. So, such as, you know, the automotive area. And then new aero-defense and aerospace, and then third area is the data center in cloud. And then, down the road, will be medical area, so that we can start to help them to provide all the various tool, software, and IP to help the design. And then, along the way, we also very starting to pay attention to building up the security. Security become very important for the connected world. And it's a lot of vulnerable area, that we need to make sure that make it safer, more trusted environment, that we can work on. So those are the few things that we are kind of building block. So my job is not finished yet. We still have a lot of innovation needed to support that system design enablement vision.

**Kapoor:** Because I remember security was a big issue when we were discussing cloud, the tools in the cloud.

**Tan:** Yes.

**Kapoor:** So I assume that some of those issues are being resolved.

**Tan:** Yes, we are working on it. So, stay tuned. That is the direction Cadence will be moving forward.

**Kapoor:** And is the Cadence lab, Berkeley lab, still intact, and is work going on there?

**Tan:** Yeah, so what we did is, when we went through that difficult time, 10 years ago, we decided to bring the R&D into the company, rather than, you know, have a lab outside, so that we'll be more integrated to our design in R&D. So that part, we've been doing that. And so, answer your question, do we still have a Berkeley lab? Answer is no. We bring it inside the Cadence. But what we did is, basically, we reach out to multiple universities with their professors. We provide grant, providing support, and research. And that will be more effective. And then, rather than have a lab in a university. But we work closely with multiple univer... professor, university professors, on the specific topic. And then working with R&D very tightly.

**Fairbairn:** So you mentioned the emphasis on system design in Berkeley. Alberto Sangiovanni-Vincentelli has always been a strong proponent in that area. Is he still involved? Is he still on the board?

**Tan:** Yes, very much so. And Alberto is my lifetime teacher, and always learn from him. And as you know, he's a very big believer in system and system design. Abstraction. And we take it to heart, so we integrate into our products. And then, of course, he's very strong in automotive, and something that we cherish a lot, learn from him. So he's still on my board, and from time to time, learn a lot from him. And my team benefits from his association.

**Kapoor:** So what are the top challenges that you see, currently, in terms of technology, in terms of solutions for problems? Can you talk about that?

**Tan:** Yeah, there's a lot of challenges still in front of us. Clearly, the design complexity increases a lot. And so we work very close with our foundry partners on the seven nanometer, five nanometer... And so something that is continue to drive the innovation in some of the working closely with our foundry partner, make sure that our tools [ph?] and IP are optimized for those process node. And then the other ...challenge is the low power. I think, as you know, power is really the gating item. And Moore's Law, you know, the double the transistor, and then the power, and that is starting to become more challenging on the power side. And so something that we are paying a lot of attention on the power, and how to drive more power efficient, like the neuromorphic I mentioned earlier. And more like brain, that you wake up your process and you go to sleep, and so you can save the power. So I think those power, you know, efficiency [has] become very critical area. And then, thirdly, is a new material. And then some of the new material, like the high-voltage RF switch and power amplifier. You need new material for doing that. And then same thing with memory. And so some of this new carbon nanotube can be a very interesting innovating area for new material. And then, in terms of Cadence as a whole, we always challenged just to find the high, top talents from the industry. And many time we have to compete with Google and Facebook for the best talent. And that's not easy, as you know, in terms of compensation, the

environment... we have to ...adapt for the ...next-generation leaders. And so top talent recruitment is always a challenge.

The other part is very personal for me, is that I like stronger diversity. And so we are delighted... we have two female board members, Sue Boston and Maggie. And we are delighted. And we also have... reached out to some of the industry leader, like Young Sohn, Chief Strategy Officer and President of Samsung on our board, and then we also have Jim Plummer, long-time dean of Stanford, on my board. And so we try to [have] knowledge-based board members that are actively engaged with us. And then, one thing that we have unique at Cadence, I used to be come from the Cadence board. So the board and the management work as one team, very tightly, in term of driving the productivity, the management, scalability. And that's something that is a important challenge for us, to go to the next stage, you know, when we moved the system design enablement. And also, you know, in the management, we try to have this adoptive learning. And so, when you go into the system design enablement, we have to learn new industry requirement, from aerospace, defense, automotive, and, you know, medical. It's something that we had to learn, some of this new technology... industry, and how can we be more relevant in providing the tools [ph?] and IP for their design. That's something that I really want to help my team to work on, kind of adoptive learning, so that we continue to learn and providing relevant design activity for them.

**FKapoor:** So you mentioned earlier, the challenge of hiring talented people. And somewhere I had read that lot of the people were looking at social media, and you're trying to convince them to look at semiconductor technology and related challenges. How is that going?

**Tan:** Yeah, it's a big challenge. I think I start with the universities. And so I work with many, many professors, and as you know, I'm a trustee at Carnegie Mellon University, and I'm a board trustee, and also the advisory board to the dean of engineering at CMU. And in the past, I'm also the dean advisory board at Berkeley, and also the Berkeley, CMU and MIT, and also Nanyang University in my college. And then, working with them to make sure that the professors know semiconductor still a lot of innovation needed. It's not a sunset industry. Because they have so much influence to their students. And if I want to attract the best talent, I want them to be my ambassadors to not just semiconductor, even EDA. It's very important on the design side. So just something that I had to start doing that. Secondly, you know, I'm very... as you correctly pointed out, I'm the most connected person in the high-tech industry, so I reach out to the system and service provider, and especially the hyperscale cloud companies, to let them know that, you know, the social media company is very important, [but] all this killer app will not function if our silicon foundation are not strong. Give you one example. My cell phone, you know, I had to carry two batteries, and I carry three phones, because by 11 o'clock in the morning, the battery run out. And unless I switch off all my killer apps, and \_\_\_v\_\_\_ chat, you know, the Messenger, the Slack, and so many others. And so I'm very connected, and I love those killer apps. But the battery runs out. The processor become so... too slow, and then the cloud security is a big issue. So those are the issue that we need to address as a industry, and we have to work together. And the foundation is semiconductor and silicon. We have to make sure that it's very secure.

**Fairbairn:** So following up on that question about recruiting, do you still continue to focus growth in Silicon Valley? Or do you find the need to expand into other areas, in order to continue to grow, from a recruiting point of view?

**Tan:** Yeah, it's a good question. And so, we are a global company. We have 50-plus offices throughout the world. It's very important to recruit top talents, and so that we can, you know, the veteran worker can work closely with the start-up college kids, so that they are fearless, they have a lot of innovations, and a lot of great ideas. We need to listen to them and work closely with them. So we have a university program, focused on a couple universities, attracting the best talent, with the professor and deans. And then, secondly, we want to make sure that those college kids come to us. They feel welcome. So we have a very active internship program, to... that's the best way to recruit the talents that become our ambassador to some of those university we targeted. And then, the other part is, you know, we also have... we now have a big effort, in term of changing our culture, our environment, to be more, you know, welcome for them, in term of color of the canteen, you know, the wall, and then some of the table, you know, rather than a very traditional table, we try to create little bit more small group, you know, the activity. And so we try to help them. We hear them out, we form "Debate and Decide", you know, feedback group, so that we can listen to the young generation. We call it the Z generations, now. And then hear their feedback, what can we be better? Same thing, we want to change our website, to be more, you know, friendly to them, and then more useful to them. And the social media connectivity, you know, the community is very important to them. So we want to make sure that we are... we create that kind of environment, that they are happy. Even our dress code, you know, we don't have tie and suit anymore. We make it more easier and more friendly, and more flexible, so that they can be enjoy working in the campus.

**Fairbairn:** But your R&D recruiting is focused mainly in Silicon Valley? Or do you have major R&D groups elsewhere, outside of Silicon Valley?

**Tan:** Many... very much so outside, also. And so we have a big site at Austin, in the US. And so we explore different locations. We are very big operations in India. We have close... more than 2000 people in Noida and Bangalore offices. And same thing in China. We have Beijing and Shanghai offices, and then... and same thing in Israel. So I think we have this kind of global 50-plus offices. Brazil is another great office we have, through acquisition. And then, now we try to expand that. They have a lot of very good talent from universities, and we're recruiting them. So, globally.

**Fairbairn:** So switching to Walden, what are the major changes happening in the investment business that you're involved in there, either in terms of the structure or in terms of the areas of technology that you're focused on investing in?

**Tan:** Yeah, couple of changes we make, and one is, you know, back to this "think globally, act locally." So we have the investment decision, make... in locally. In the past, we are more US-centric, and then now I let go. Let the local team decide locally, just serve as a advisor. That turned out to be very successful for us, so that we can respond faster, and they know [their] local needs. Their business models are very different. And so that they can respond quicker. And so that for me also good, because I can learn what



works in different countries. And that's something that I [find] very fascinating, from day one. I like to learn different countries, different cultures. They have different... business models. And that works very well. And then, secondly, big changes for us, we decided to specialize. And so... and in the past, we invest in anything that can make money, and then back on the people, and we come back. And lately, we've become more targeted, more specific, into automotive, you know? And because it's a sea change, it's a big platform. Social media... we've done very well with Cena [ph?] \_\_\_\_\_ and then round of Matewan [ph?]. And then this whole e-commerce is taking off. And then, also, we invest in some of this 3D animations. My partner invest in the company called Original Force, world-class 3D animation productions, in Hangzhou. So I think, you know, we are kind of more focused on e-commerce, social media, and then I'm heavily, with my partner, Hing Wong, focused on the semiconductor and the ecosystem. And that's something that we're more... a lot more specialized, and we become... the domain knowledge is much stronger. The barrier entry are much stronger. And so, in a way, the entrepreneur start-up guy, they look to us as a investor, because we know the space, and we have a, you know, have a patience to build a world-class company for 10 year, 15 years. So we have the reputation that we like to... we are business builder, rather than just a pure VC. And so we help them to build business, help them to recruit the talent, help them to introduce a customer, because of our connection, and also our affiliation. Many of the industry giants are investors in our company, in our fund, so that we have access to them, to help them to really be, you know, successful in their business.

**Kapoor:** So how would you advise a person who is just starting a career? What would be your recommendation?

**Tan:** Well, three recommendations. One is, my professor's advice is very good. I treasure the whole life. And, you know, keep an open eye, and open mind, and then take calculated risk. And that, I think, is very important. Secondly, work hard. And I still remember when I started, and I have a file for each industry. And I really read a lot, in term of research report, and then in term of visiting company. And I still keeping that. And so, in a way, continual learning, so that you become relevant, and then, also, you're able to pick up what are the new trends happening. And then, thirdly, it's very important build the... find your mentor or mentors. And someone you can trust, that can give you the guidance. And I treasure couple of my mentors, over the years. And when I become a CEO, couple of very dear friend CEOs, they become my mentors. And they gave me advice, and then I can brainstorm with them. That, I think, is a very, very valuable, that money cannot buy.

**Kapoor:** Any recommendations, or any thoughts, on philanthropy? There's a lot of people hurting in the society. Any thoughts on that?

**Tan:** Yeah, that's something that is very dear to my heart. And so, something my wife and I, we put our foundation together, and something that we feel very strongly. One is education. And so, you know, the couple of area that I'm very interested. So I endow the professor shares, and I... and then providing the fellowship. And even my two sons' high school, [where] I endowed the Tan Scholarships for math and science. I think math and science [are] critical for the, you know, the new in high school kids. It's important. It's very strong foundation, that you need. And we... strongly believe in that. And so I think the other part is, and now... low-income family, we like to give the kids a chance to get educated, and my

wife, especially. You know, in the Dalit community in India, we help kids... to make sure that they have a chance for better world. And so something that we're very passionate about, education. The other part is, now, we are very, very fortunate, living in the Silicon Valley. And, you know, it's... you know, compared... we are kind of 1% of the wealthiest person in the world. There's a lot of very less fortunate people. So couple of areas that I'm very passionate about is the homeless. And so I used to be on the board, and I'm still a big supporter of Bay Area Rescue Missions, and something that give... you know, we all have difficult time in life, and then give them a helping hand, and provide them meals, and then they can put their life together, especially single mothers with young children. That's something that we feel very strongly about, and we support that. The other part that we support a lot is the justice. And there's a lot of child labor and exploitation. So we are a big supporter of International Rescue Mission, globally, and helping them. We're providing the equipment to help them address more cases, because they are limited with their computers. And so we try to support that, and something that is very dear to our heart. And then, much broader than that, you know, we support some of the... like India, you know, eye disease is a big one. We support that organizations. And so I have a long list of charitable... and we never give enough. I always... my mom always give me the good training. First of all, whatever... when I was small, everything you get, 10%, you can give to somebody else. And that has been [advice] I treasured the rest of my life. And if you don't start small, when you... have to write a big check, it becomes harder. It never come across my mind, and it just... 10% set aside, and then give to... then you're starting to form the philosophy of giving, and [thinking about] what are the areas that you want to give. And then, the other part is, you know, the... it's very important... I always believe, a very good advice that I receive is give until you feel the pain. And then, if you give, you know, until you become painful for you, that mean you're good. And then, somehow, the giving is more joyous than receiving. And take my word for it. And the more you give, the more you enjoy. And then, how many you can takes. And to a point, eventually, one of those days, we have to leave this world, and you accumulate a lot. And then, what is that good for? And then, so, in some way, you know, don't wait until you are old age, then you try to think of giving. But just give when you have \$10. \$10, you give \$1. As a practice. You know, \$1000, you give \$100. So it becomes automatic, and it become not a pressure at all, and it's joyous to do that.

**Fairbairn:** That's a great way to wind up. Do you have any other...?

**Tan:** Yes, thank you so much. I hope, you know, got the objective that you like, you know?

**Fairbairn:** Yes, that was a wonderful conversation.

**Kapoor:** Thank you for your time.

END OF THE INTERVIEW