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## PC Evolution: How Software Virtualization Pushes Hardware to the Back Seat

By Eli Segal

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Celebrating five generations since the birth of the computer circa 1937, our beloved computing machines have dramatically morphed shapes, sizes, and capabilities throughout the past 70 years to become what we now know as the PC. Quickly adapting to the technological advancements that have turned the original computer from a research project to man's inseparable new best friend, the consumer's expectations of a PC have skyrocketed. And rightfully so- as technology becomes key to our future, we naturally should be forward thinkers.

If we look back at the previous century's most memorable watershed moment of innovation that struck and enlightened the mass public, it would be IBM presenting and awing the public with the Personal Computer. Most importantly, IBM introduced the concept of the individualized computer experience, completely changing how consumers viewed and used their machines and leading us into the current PC market. Microsoft furthered this development by leading the user friendly interface revolution with the creation of Windows. This was strongly supported by the ever improving performance of hardware, especially GPU and CPU developments, pushing the user-experience to the next frontier.

However, in today's fast paced society, the once advanced boxy beige PCs and company have long been shelved along with the "bigger is better" mentality. As we continue to be more entrenched in our current super consumer society, we have the opportunity of more choices and thus have become even more exigent in our expectations. As expert multi-taskers with busier lifestyles, simplicity, flexibility and rapidity have become our new mantra and virtualization has become our answer. Keeping in step with higher customer expectations and "the sky is the limit" culture, virtualization software is surpassing all preconceptions and leading the next generation of PCs well into the 21st century.

Even though virtualization is not a new concept, the flexibility of multi-user software and its ability to complement our lifestyle has slated virtualization as one of the most covered markets on the digital map, making it almost impossible to read a PC trade publication without seeing the V-word. According to a Gartner analyst, virtualization will be "the most significant trend by 2012". Originally conceived in the 1960's, virtualization was developed to address the underutilization of mainframe computers used by large companies for data processing. While mainframes were reliable and serviceable, the space and costs of each machine was substantial- and enough to explore the need for a more manageable and

accommodating alternative. Server virtualization achieved the goal of utilizing a computer's unused processing power to fuel thin clients or virtual machines, yet there was a very high price to pay...user-interface quality and experience. Ultimately, IT professionals' original excitement about the concept of thin clients gradually waned as its limited applications and software support were noted, as well as the importance of maintaining a full PC standard. The same was discovered with virtual machines as the end user was found with limited resources, severely hindering the user experience. Thanks to cutting edge technology, today's virtualization enjoys the best of both worlds- not needing to compromise on manageability and flexibility while maintaining the best user-experience of the PC.

The reason for the current virtualization craze is due to new cutting edge software that can convert one PC into multiple virtual PCs without using any additional proprietary hardware, and not compromising on PC performance. The uniqueness of this breakthrough solution is twofold- it ensures the reliability of a full PC experience with rich user interface while providing the flexibility of multi-user technology. The concept of using minimum hardware and ultimately replacing hardware with software, is not a passing fad but rather a telltale image of the next generation PC. There is a plethora of reasons why small and medium sized businesses (SMBs) are rejoicing and opting for this multi-user software- the primary factor being cost. Businesses can dramatically cut their total cost of ownership (TCO) to a fraction of the original price since only the host PC is needed to connect and fully operate multiple PCs. Without needing to compromise on performance, these companies can gain a competitive edge as they will significantly save on maintenance costs as well as inventory and storage space. Moreover, shipping costs are dramatically cut down as software is replacing hardware, and reducing the risk of damage by providing a more portable solution, sent at the touch of a button.

As the product of the most cutting edge technological advancements, software virtualization is consistently in step with consumer needs and caters to organizations beyond the business market. Due to its flexibility, this solution is aligned and able to keep up with computer industry trends and accommodate every PC level-whether high, low, or mainstream. Without needing additional proprietary hardware for the virtual workstations and with the flexibility to buy standard hardware purchased locally for the host PC, multi-user technology can be an especially beneficial solution for governments and educational institutions focused on not only addressing, but finding a truly effective solution to help bridge the digital divide. While there certainly have not been a lack of initiatives and programs focused on expanding computer literacy to reach developing nations that need it the most - none have really worked. Political corruption and bureaucracy aside, these programs were unsuccessful because they only focused on cutting costs, bypassing the quality factor, and essentially providing a "dumb computer". By using only software and cutting out additional proprietary hardware, multi-user technology has the potential to succeed because it delivers a full PC experience at a low cost, thus providing the proper and necessary tools to actually close the divide. If the goal is helping third world schools and companies to connect to the global digital community, then the focus on providing equal opportunities with equally high-powered computers cannot be compensated for low prices. By only needing to buy one PC to create equally high performance virtual PCs, the same benefits of a full-power PC can be achieved at a fraction of the price.

In addition, multi-user technology is leading the Green IT movement forward by offering the opportunity to 'go green' while positively influencing business practices monetarily. Although there is already plenty of awareness regarding environmental efforts in the office, multi-user software can effortlessly help shrink carbon footprint as well as unneeded expenses. New virtualization technology can maximize a PC's power capacity since one PC can be converted into multiple "virtual" computers, and consume only the energy of the host PC. Less electricity expenditure results in significantly curbing expenses as just 1/5 of normal PC consumption is used in addition to lowering CO2 levels well below the thousands of pounds emitted from the average PC annually. For example, if the IT portion of electricity consumption in a small medium business amounts to \$500 monthly, using a solution that extends one PC into multiple workstations can reduce these direct expenses by 80%, to a mere \$100 a month. Since much less hardware is needed, a substantial amount of e-waste is curbed, while also saving considerably by downsizing hardware purchasing. With less hardware, businesses' air conditioning bills are much lower, as there is less of a risk for computers to overheat.

Software virtualization is the second wave in PC revolution as it is ingeniously able to simply and effortlessly keep up with our lifestyle. Multi-user technology is redefining our expectations and raising the bar as the next generation PC by offering for the first time, a flexible, cost efficient solution that facilitates results and productivity in many fields. Now if only software virtualization could do the dishes...

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Eli Segal, CEO of MiniFrame

Mr. Segal has played an important role and has strongly contributed to the IT and Telecommunications industries in Israel for the past twenty years. Previously serving as Bezeq's Vice President, Mr. Segal was responsible for business subsidiaries and strategic planning. Mr. Segal holds a BSC in Computer Science from the Technion and an EMBA from Bar-Ilan University.