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NEW GPU-COMPUTE
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THE CHANGING COMPUTER WORLD

HP Inc. says it's strong, on track, and has plans for layoffs

C'est la vie in the PC world

By Jon Peddie

HP Inc. manufactures printers, laptops, and personal computers. It spun out last year, leaving HP Enterprise to concentrate on cloud, big data, infrastructure, IoT, and other enterprise-y sorts of things.

This week HP Inc. marked a major milestone for the company. It's one year after the separation, CEO Dion Weisler got to ring the bell on the New York Stock Exchange, and the company announced plans to refocus, grow, and share benefits with the stockholders.

Starting out with the good news, HP said it is on course to raise earnings per share and increase dividends by 7%, and the company will start a $3-billion stock buy-back program.

As is pretty common for computer companies these days, the results presentation wasn't so much about how much money HP Inc. made but how much less it lost than last year and how it plans to even lose less next year. Furthermore, the company outlined plans for improved margins and a return to growth.

Last month HP announced plans to buy Samsung's A3 printing business in a $1.05-billion deal. With the acquisition, HP has pledged to disrupt and reinvent the A3 segment. Weisler credits the separation with HP's ability to make the move to acquire Samsung's printer business.

In a call announcing the Samsung deal and at the recent analyst meeting,

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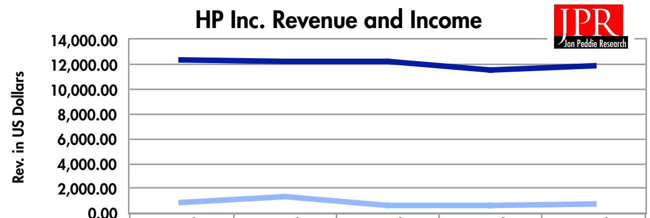
Source: HP financials



	Qtr ending 2015-07-31	Qtr ending 2015-10-31	Qtr ending 2016-01-31	Qtr ending 2016-04-30	Qtr ending 2016-07-31
Total Revenue	12,362.00	12,266.00	12,246.00	11,588.00	11,892.00
Net Income	854	1,323.00	592	629	783

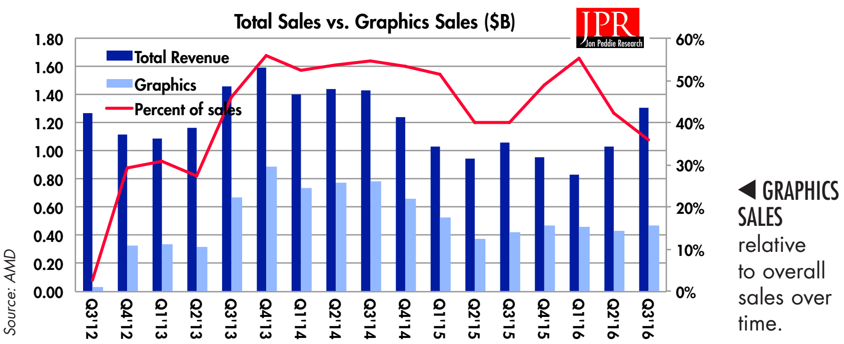
HP IS BELT-TIGHTENING to raise the bottom line. ▶

FINANCIALS

AMD Q3 2016 results

1.3 billion in sales, $406 million GAAP loss, sales and non-GAAP profits up

By Kathleen Maher



◀ GRAPHICS SALES relative to overall sales over time.

AMD reported its calendar Q3 2016 revenues of $1.307 billion, an operating income (GAAP) loss of $293 million, and net GAAP loss of $406 million, or –$0.50 earnings per share (EPS).

Revenue was $1,307 million, up 27% sequentially and up 23% year over year, primarily due to record semi-custom SoC and higher GPU and mobile APU sales, partially offset by client desktop processor and chipset sales. That beat the company's estimate of 18%.

The company's gross margin was

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SOFTWARE SHOWCASE

compiler system, a runtime library, and an integrated development environment (IDE). The compiler's system contains a front-end and several back-end compilers. The front-end compiler translates high-level constructs in low(er)-level constructs that can be handled by the back-end compilers. The front-end compilation automatically detects and extracts serial and parallel loops that can be executed on the target device (e.g., CPU or GPU). Also in the front-end, device-independent "host code" is generated to invoke the extracted parallel loops on the target device. The obtained intermediate Quasar representation is then either compiled to byte code, or interpreted directly. The back-end compilers generate C++/CUDA or LLVM code and invoke existing native compilers (e.g., GCC, Clang), to generate a device-dependent binary.

The Quasar runtime system consists of four major components:

1 A memory manager (which performs automatic memory allocation/deallocation/transfer between devices)

2. A scheduler (for deciding on which device a certain loop is executed)

3. A load-balancer (for making sure that each GPU/CPU thread has sufficient work)

4. A device back-end (which communicates with the underlying hardware through CUDA or OpenCL)

Finally, the results can be visualized via OpenGL (possibly via user interaction) or written to disk.

By default, code is generated for both CPU and GPU, so that the runtime system can dynamically switch between CPU and GPU, depending on the current load (load-balancer), the complexity of the task (e.g., a 1D loop that iterates over five elements versus a 3D loop that iterates over all pixels of a volumetric image) and the memory transfer costs. This is all done fully automatically.

The university has developed several examples to demonstrate the power of the compiler, such as the Redshift IDE real-time 3D rendering of a video sequence. The university has extended the compiler to the cloud, and developed autonomous vehicle applications with it. More can be found here.

And you can learn more about Quasar here and here.

What do we think?

The amazing work being done at the University of Ghent doesn't get as much exposure as a paper from Stanford, MIT, or the University of Cambridge might get. That's too bad; the Quasar compiler could be an answer to a lot of prayers. It's free to license and demands a good look. Say thank you to Imec and the Flanders government.—J.P.

Think Silicon's NemaGFX graphics API

Smooth graphics and animations for fast, responsive touch-screen applications

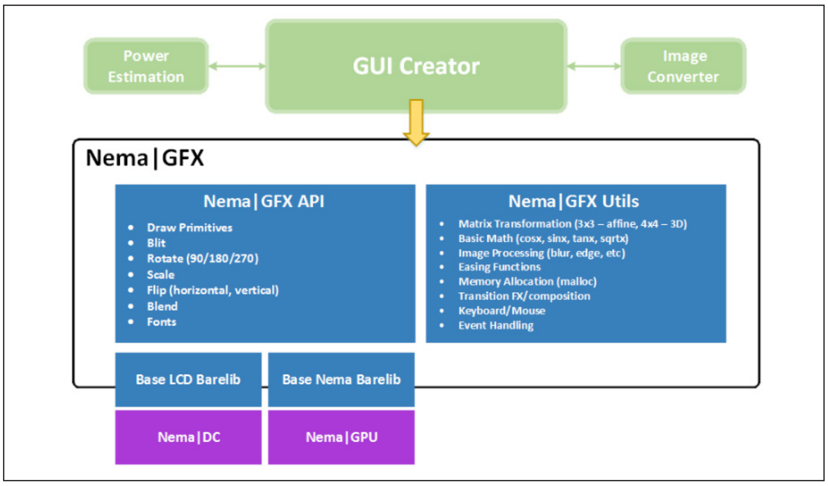
At IoT Solutions World Congress recently, Think Silicon introduced its NemaGFX API which Think Silicon designed to accelerate high-quality GUI development for embedded and wearable devices. The key differentiation from other API offerings, says the company, is support for ultra-low-power functions without the overhead of unnecessary programming instructions for IoT hardware. An SoC with Cortex-M or a microcontroller paired with the NEMA GPUs and NEMA Display Controller offers developers direct access to the full range of capabilities to create GUIs for ultra-low-power devices.

Think Silicon says they have designed the NemaGFX API from scratch in order to reduce application development by providing a minimal yet very powerful set of functions. By including the frame buffer and software libraries all in the SoC on-chip memory, they eliminated customers' need for external memory. "The support for a fast, low-power executable will help developers with the essential building blocks for use with NEMA GPUs to create new classes of embedded and wearable hardware," the company says.

Think Silicon says the NemaGFX API provides the following features and benefits:

- Small memory footprint optimization, which eliminates the need for costly external memory
- GUI image enhancements for perspective-correct 3D projection, transparency/alpha blending, color keying, and multi-function image processing
- Performance- and power-optimized code for flexibility in development for programmers
- Support for multiple color formats for both source and destination textures
- Support for multiple operating systems and non-OS systems (including real-time operating systems) in resource-constrained environments
- Command List support, which decouples CPU and GPU execution and provides the ability to reuse a Command List multiple times, resulting in lower CPU utilization

Think Silicon says the API offers developers support for a variety of geometric primitives. The API also allows for affine and 3D transformations, including 2D/3D rotation, scaling, and shearing. A complementary element, NemaGFX Utils, provides access to



Source: Think Silicon

THINK SILICON'S NemaGFX organization.

SOFTWARE SHOWCASE

high-level operations such as events, image processing functions, and memory allocation algorithms. The combination of these tools supports GUI development.

What do we think?

IoT devices are permeating our bodies, homes, and imaginations. As they proliferate, and in the process attract malware, better UIs are needed to enable easier setup and operation, and easier, more effective security.

As part of the Horizon 2020 program, the European Commission has selected Think Silicon to participate in the SME Instrument initiative. The company was founded in 2007 with the vision to provide high-performance/low power graphics IP semiconductor modules.

The company shifted from the mobile world to the rising IoT/wearable era just as the requirements were changing rapidly. Devices like smart watches, glasses, patches, or even smart clothes are equipped with displays and require high-quality graphics. The main challenge in these new devices is the battery life and how to make them last more than one day without searching for wall plugs and charging stations.

Think Silicon says their technology enables cost-sensitive products to have "smartphone-like" graphical user interfaces and/or gaming-class graphics speed.

Using 3D mapping to diagnose lung disease

The tools are available, but not widely used

Jan De Backer was working at Boeing in 2003 doing Computational Fluid Dynamics (CFD), a development that had a big impact not only in the aerospace field but also in the automotive area. The aerodynamics of Formula One cars changed drastically as a result of using more and more CFD-based optimization and the drag, and hence fuel consumption, of large trucks was significantly lowered using these flow simulations.

Returning home, De Backer showed his father, an eminent professor in respiratory medicine, what CFD could do. The senior De Backer asked Jan whether it would be possible to simulate flow not just around wings, but in the human airways and lungs. That was a defining moment, not just for Jan but for the respiratory field in general, and resulted in the forming of Fluidda in 2006, in Kontich, near Antwerp, Belgian.

The problem with the current lung function test is it only partly reveals what is happening in the lungs and airways. In respiratory medicine, the doctor relies on a "stress test" to assess the state of the patient's respiratory system. The most commonly used parameter in this test is the "Forced Expiratory Volume in One Second" or FEV1. This is simply the amount of air a patient can exhale in one second. This value is subsequently compared to reference values of corresponding healthy volunteers and expressed as a percentage predicted. So, if a patient has a predicted FEV1 of 100%, the lung function is considered normal. It is assumed if certain areas in the lung are obstructed, this forced maneuver will indicate it.

However, it could just as well mean that a stable FEV1 is the result of compensation by healthy lung zones for the initial and progressive failure of a diseased lung area rather than a sign that nothing changed inside the respiratory system.

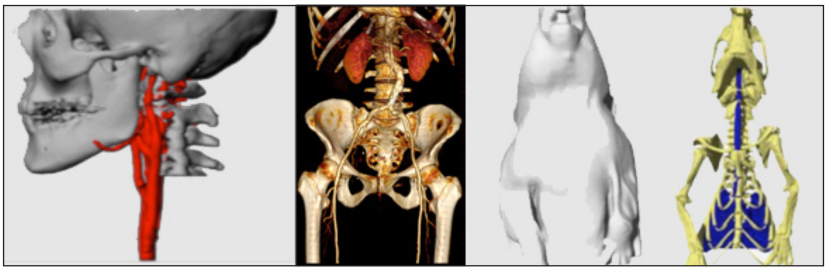
De Backer recognized that, and argued (and continues to argue) that we should use methods that provide a direct view so we can establish how much of the anatomical structure is still healthy and how much of the "reserves" have been used. It is an illusion, says De Backer, to think that one parameter will tell the whole story, and yet the majority of clinical trials still use the primary endpoint approach.

De Backer thought CFD techniques would give a better view, and subsequent analysis, and so he spent the next couple of years developing functional respiratory imaging (FRI), a proprietary quantitative imaging technology combining CT imaging with advanced engineering. It combines CT images with two advanced computational fluid dynamics tools: Computational Fluid Dynamics (CFD) and Finite Element Analysis (FEA).

The segmented model forms the basis for further functional analysis using either flow (CFD) or structural (FEA) simulation.

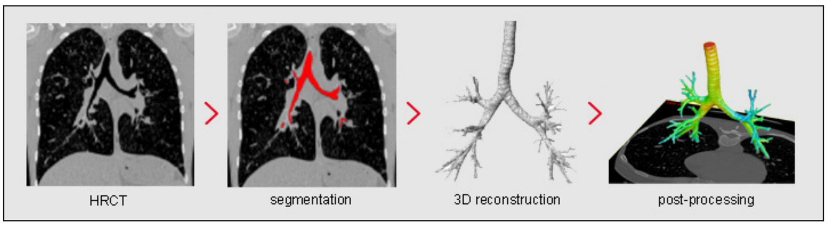
FRI is then used to construct 3D biomarkers of the lungs. FRI generates patient-specific biomarkers: 3D visualization of patient's airway and lung geometry that can monitor patient outcomes with high sensitivity not possible with previous techniques or systems.

The effectiveness of these biomarkers in facilitating correct diagnoses and monitoring patient outcomes has been impressive. De Backer says it has been validated in more than 20 clinical trials, conducted with more than 750 patients, performed in collaboration with various academic and medical research centers. These trials confirmed the higher sensitivity of FRI, through its use of bio-



Source: Fluidda

SEGMENTATION WORKFLOW using FRI.



Source: Fluidda

SEGMENTATION AND visualization examples with FRI. Source: Fluidda.