IBM Watson + Power Systems mainstream Cognitive Computing

Five years ago, powered by IBM POWER7 servers, a master-bedroom sized Watson broke into public consciousness making headlines as an undefeated champion against past Jeopardy winners. At that time, we predicted Watson's potential role in realizing decades of promises made by technologists. It would allow computing that would solve incredible problems with services and solutions that were previously inconceivable. Watson was conceived and designed to rapidly absorb, process and analyze data in virtually any format.

Watson can't solve every conceivable problem. However, by allowing a broad cross-section of IT to leverage and extend Power System[1]'s processing capabilities, it made possible a new era of intelligent, cognitive computing. With the latest POWER8[2] servers, a rack-sized (24 times smaller), faster (42x) and more accessible Watson delivers services and applications to fulfill that vision. This blog gives an overview of the OpenPOWER-driven evolution of Watson as it became an attractive, accessible and usable path to a new era of Cognitive Computing.

From Games-player to solution platform

With programmable systems computing reaching the physical limits of Moore's Law, Watson defined and ushered in a new way of computing as a platform that not only understands, reasons and learns, but also teeters on the edge of thinking! It provided a new approach to Cognitive Computing, able to deliver on the promises of past efforts at Artificial Intelligence (AI), without the shortcomings.

After winning Jeopardy, IBM wanted to demonstrate Watson as more than a games-player. The team sought out high-profile, extremely difficult problems where Watson's ability to rapidly learn, process and analyze vast quantities of data was phenomenally useful. Medical science research and development, e.g. cancer treatment protocol modeling and financial services analysis were obvious and early targets.

Impressive and effective achievements followed. But, these projects couldn't drive a volume market. The future was limited for what was perceived as an expensive, esoteric device achieving results with an up-front investment of levels of time, material and personnel resources available only to super wealthy government agencies, universities and enterprises. The process of educating, accessing and

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[1] http://www-03.ibm.com/systems/power/announcement/
[2] http://www.ptakassociates.com/content/, for IBM product info see: http://www-03.ibm.com/systems/power/hardware/index.html?LNK=browse

applying Watson capabilities needed to be accessible, easy to use and quick to complete operations.

Power Systems provide the base
Taking Watson mainstream escalated already steep demands made on the base technology. The system had to be accessible to the widest possible developer/user community. This meant open computing, its standards, tools and architecture applied to the hardware and software. For IBM, a Linux-based Power System was the obvious platform for Watson. The POWER architecture was designed to deliver supercomputer operations and scaling without overly specialized staff and training.

For mainstream computing, Watson has to be widely available e.g. via a public cloud. For easy accessibility and use, it had to extend the boundaries of natural language interaction. To speed learning and analysis, it had to rapidly access and process multiple terabytes of data (much of it unstructured). An open architecture was most likely to attract many, different contributors to use and enhance Watson.

OpenPOWER servers were designed to meet these requirements for big data analytics, supercomputing processing and extremely fast operating speeds. They operate large numbers of parallel threads while providing fast memory access to terabytes of data. A Coherent Accelerator Processor Interface (CAPI) bus speeds and simplifies rapid data access.

The Linux environment and strict adherence to open system computing standards and protocols allows users to focus on market, not infrastructure issues. A growing OpenPOWER Foundation[3] ecosystem attracts members to build special-purpose accelerators, and/or create unique IT solutions to leverage POWER technologies down to the chip level. Recently, IBM and other Foundation members described[4] additional new technologies, collaborations and development resources to strengthen the POWER platform and expand its capabilities in ways that no other architecture can match. Highlights germane to Watson include an incorporation with Power Systems of NVIDIA Tesla K80 GPUs[5] that will almost double (1.7x) the speed Watson's Retrieve and Rank capabilities.

The emergence of Cognitive Computing

Early attempts at Artificial Intelligence required specialized experts to create solutions, as well as manage and operate the devices. This was no longer tenable. The need was for cooperative interaction between Watson and humans. Or, as IBM states it, it was about "creating a new partnership between people and computers

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[3] http://ptakassociates.blogspot.com/2015/02/ibms-billion-dollar-investment-supports.html
[4] Press release with links and white papers: https://www-03.ibm.com/press/us/en/pressrelease/48075.wss
[5] Research note on NVIDIA Tesla K80 GPU: http://ibmresearchnews.blogspot.com/2015/11/accelerating-watsons-performance-with.html?cm_mc_uid=53064961785014460405285&cm_mc_sid_50200000=1448029437

that enhances, scales and accelerates human expertise." This operating model combined with the Power Systems support infrastructure set the stage for a consumable resource accessible to a mass audience. Defining a new age of computing, Watson is the spark that ignited a 'Born on Cognitive" movement.

The Watson Ecosystem

IBM initiated a flurry of intense activity to strengthen an emerging ecosystem around Watson[6] and Cognitive Computing[7]. As it exists and is experienced today, it includes:

1. Two major technology hubs - IBM Watson East (NYC, 51 Astor Place) and IBM Watson West (San Francisco, 505 Howard St.) – which act as a client resource and experience center for hosting workshops and seminars with easier access to Watson resources for developers, start-ups, entrepreneurs, venture capitalists and universities – complemented by additional centers in Singapore, London, Melbourne and Dublin.
2. Watson Ecosystem Partners program – offering 100+ "Powered by Watson" apps that are in market with clients; apps in development driven by over 450 partners (ISVs, SIs, Digital agencies) located in 36 countries serving 17 industries with over 77K developers. They are supported by an Ecosystem Framework which includes: Watson Content Store[8] – a data mart of free and fee-based content for both general and domain specific areas; Watson Talent Hub[9] – a marketplace for cognitive, big data, UI and mobility skills staffed by third-party specialists and IBM subject-matter experts. More on these below.
3. Watson cognitive services conveniently and widely made available via Bluemix – Watson Developer Cloud[10] provides developers access to a growing library of Watson services (REST APIs and SDKs to access cognitive building blocks e.g. Language, Vision, Speech and Data Insights) for use in their applications. API's exist for services including Question & Answer, Language Detection, Personality Insights, Relationship Extraction, Face Detection, Text to Speech, Taxonomy and 21 other tasks – with more on the way.

Pursuing the links in IBM's Watson ecosystem draws the visitor into a world of technology weaving reality and potential so that one topic pulls you in to another. IBM makes it easy, almost irresistible to get educated about, involved with and interested in Watson.

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[6] http://www.ibm.com/smarterplanet/us/en/ibmwatson/
[7] General Cognitive Computing definition: http://whatis.techtarget.com/definition/cognitive-computingI and as IBM defines it: http://www.research.ibm.com/cognitive-computing/
[8] http://www.ibm.com/smarterplanet/us/en/ibmwatson/ecosystem.html
[9] https://www.elance.com/q/ibm-watson
[10] https://www.ibm.com/smarterplanet/us/en/ibmwatson/developercloud/

As a result, IBM and partners are developing and delivering services, such as personalized medical treatment protocols[11] working with IBM Watson Health[12]. Insurance and retail apps are being written to create service and product alternatives using personal data.

Some more recent use of Watson occur in sports and gamification. For example, Professional sports teams[13] use Watson to make a range of decisions including travel schedules, training regimens, (injury) recovery plans, etc. Some 33 million Fantasy Football[14] fans use Watson to build teams and trade players.

Watson also works in finance, evaluating alternatives and risks in merger and acquisition with IBM Watson Tradeoff Analytics. Watson has additional service offerings for education, energy, weather, and more.

IBM recently acquired select products and technologies from The Weather Company[15] (TWC). IBM now owns and will make publicly available TWC's collected data. They also acquired select TWC products which they will independently expand and broaden into more services. The two companies will continue their existing partnership working together to create joint solutions based on the use of Watson.

The Final Word

IBM has invested heavily in Watson. With Bluemix availability plus an extensive array of services and expertise, a greater variety of researchers, users and developers easily access an undeniably impressive, powerful platform running entirely on POWER-based technology implemented in an open systems environment. POWER technology supports and enables Watson's success as OpenPOWER Foundation partners develop add-ons, accelerators and devices that both extend and enhance existing POWER technology capabilities.

We believe Watson on POWER has justified earlier expectations of its extraordinary, groundbreaking technology paving the way to a new era of computing. It has spawned a growing community of creative innovators pushing solution and service boundaries. Take time to explore and assess Watson's potential to radically benefit your operations. We recommend that those unfamiliar with the POWER architecture or who find existing servers limiting what they can do to look at POWER Systems. We think you'll find its capabilities liberating.

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[11] https://www-03.ibm.com/press/us/en/pressrelease/46748.wss
[12] http://www.genengnews.com/gen-news-highlights/ibm-watson-health-opens-hq-launches-partnerships/81251718/
[13] http://www.sligotoday.ie/details.php?id=38159
[14] http://www.wired.com/2015/08/ibms-watson-ai-wants-coach-fantasy-football-team/
[15] http://www.theweathercompany.com/

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