インテルの考える、今後のデータセンターとクラウド

インテル株式会社
データセンター & IoT 事業開発部　シニア・スペシャリスト
田口 栄治

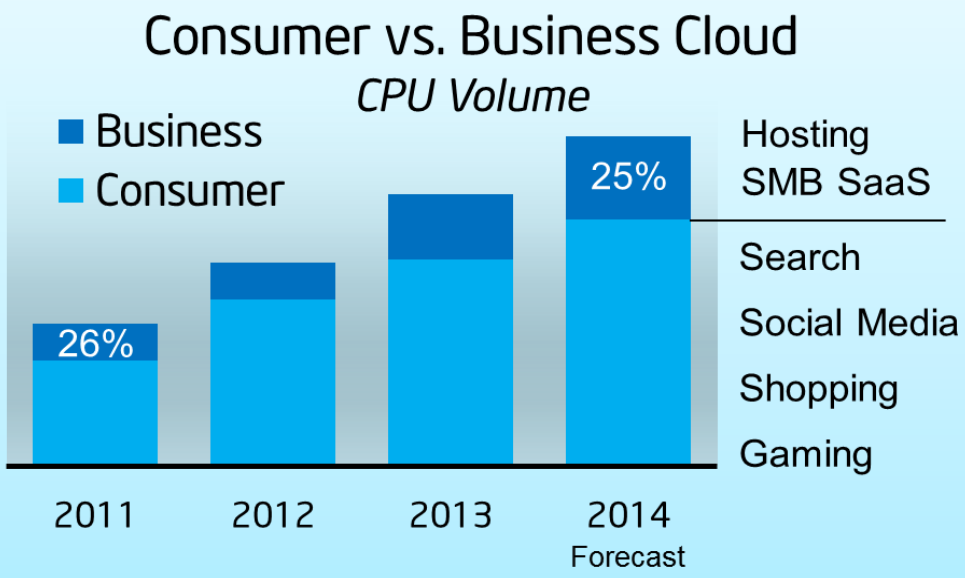
議題

- 我々が直面する課題
- IT 基盤変革の時 クラウド技術の効果と進化
- AWS 活用事例
- AWS とインテルの協業

我々が直面する課題

ビジネス成長を牽引するデジタルサービス経済

Cloud: 75% of Growth from Consumer Services[1]



新たなサービスがデバイスの需要を生む
新たなデバイスがサービスの需要を生む

クラウドの成長（2017年までCAGR20%+）†

† Source: Intel internal analysis

ビジネスとITの成長のスパイラル

…続く成長

デバイス

サービス

WeChat

amazon web services™

Microsoft Office 365

データセンター

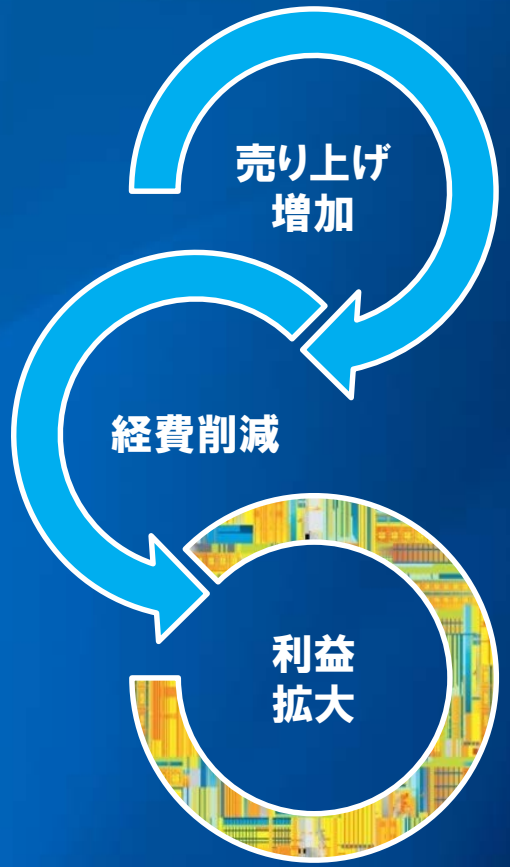
デバイス

成功のためには、新たな考え方が必要

大きなビジネス機会：データから価値の創出

X

=



物（THINGS）　　データ　　価値

エンタープライズにおける大きな機会

分析を上手に使っている企業は…

2X
データに基づく
意思決定

5X
他社より速い
意思決定

3X
意思決定に基づく
実行の速度

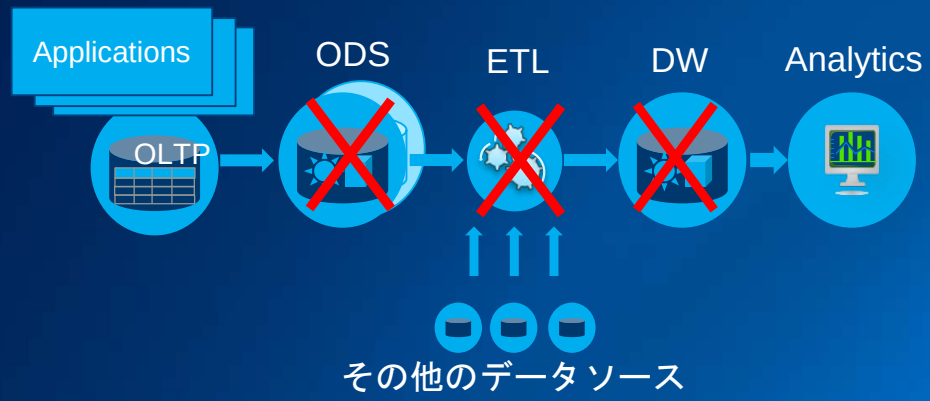
2X
決算結果
上位25%

学び成功するか、消え行くか

Source: Bain

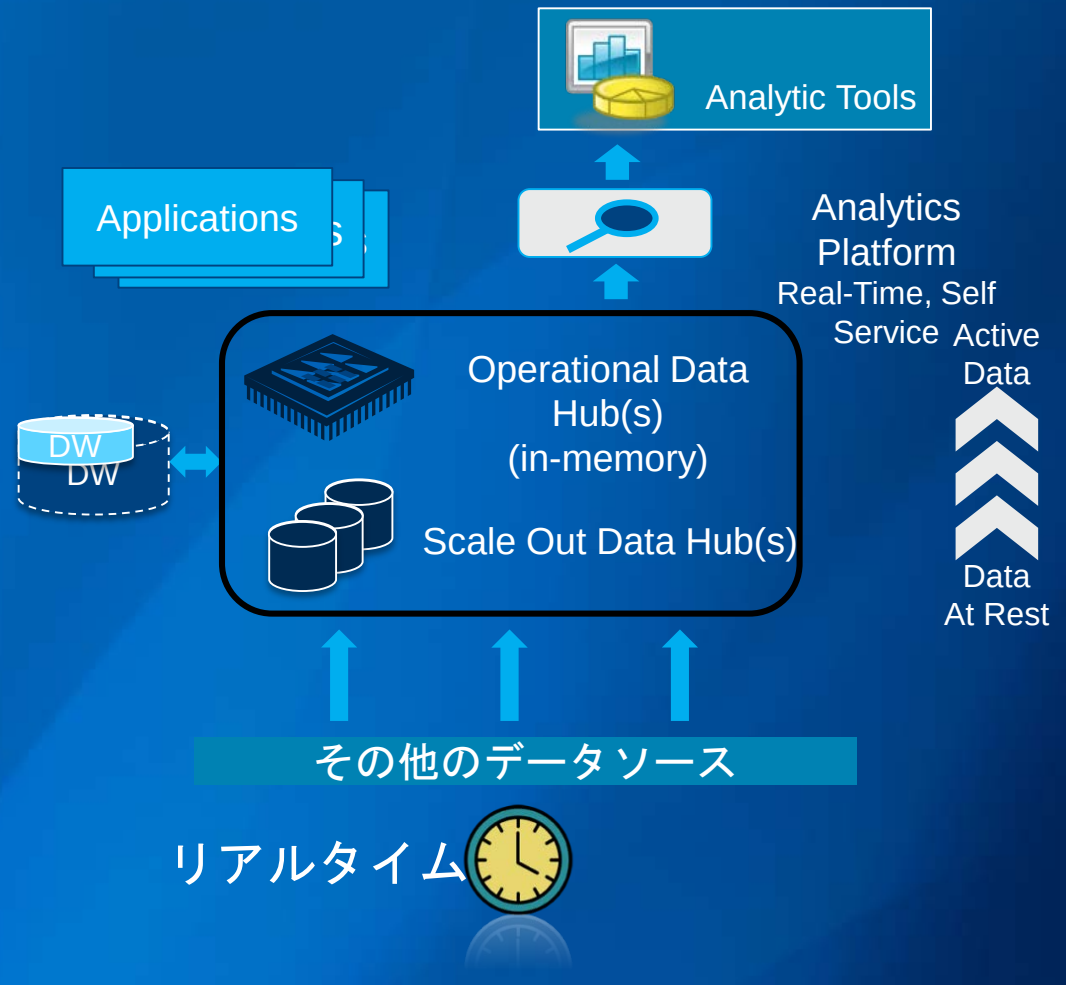
データ・ウェアハウスからリアルタイム・データハブへ

伝統的なデータ・ウェアハウスのモデル



遅延: 数時間から数週間

新たなデータハブのモデル



エンタープライズにおける顕著なトレンド

ビッグデータ

6%

のエンタープライズでは、ビッグデータ分析を基にした意思決定を実施[1]

クラウド

9%

のエンタープライズワークロードがパブリック・クラウドにて実行[2]

HPC

12%

のUSの製造業ではHPCクラスターを活用[3]

1: Intel enterprise customer IT spending survey Q1 2013
2: IDG Enterprise 2012 Cloud Computing key trends and future effects
3: Intersect360 Research and NCMS, "Modeling and Simulation at U.S. Manufacturers: The Case for Digital Manufacturing," 2011

IT基盤変革の時

クラウド化への対応は避けられない

経費削減への圧力

- より少ない予算でより多く
- グローバル化への対応
- より多種類のサービスを

俊敏性への圧力

- ビジネス速度に合わせたサービス
- **24 x 7 x 365** 何時でもどこでも

安全でコンプライアンス準拠

- セキュリティー確保
- プライバシー保護
- ポリシーや統制への対応

クラウド戦略

1. **投資コスト/運用コストのバランス**
   自由度の高いインフラ構成の検討
2. **時間短縮**
   価値創出までの時間
   安全なサービス展開までの時間
3. **サービスのオンデマンドでの提供：**
   技術革新におけるリーダーとの協業

インテルにおけるクラウド化等 IT技術革新の効果
＜2009年と2014年の比較＞

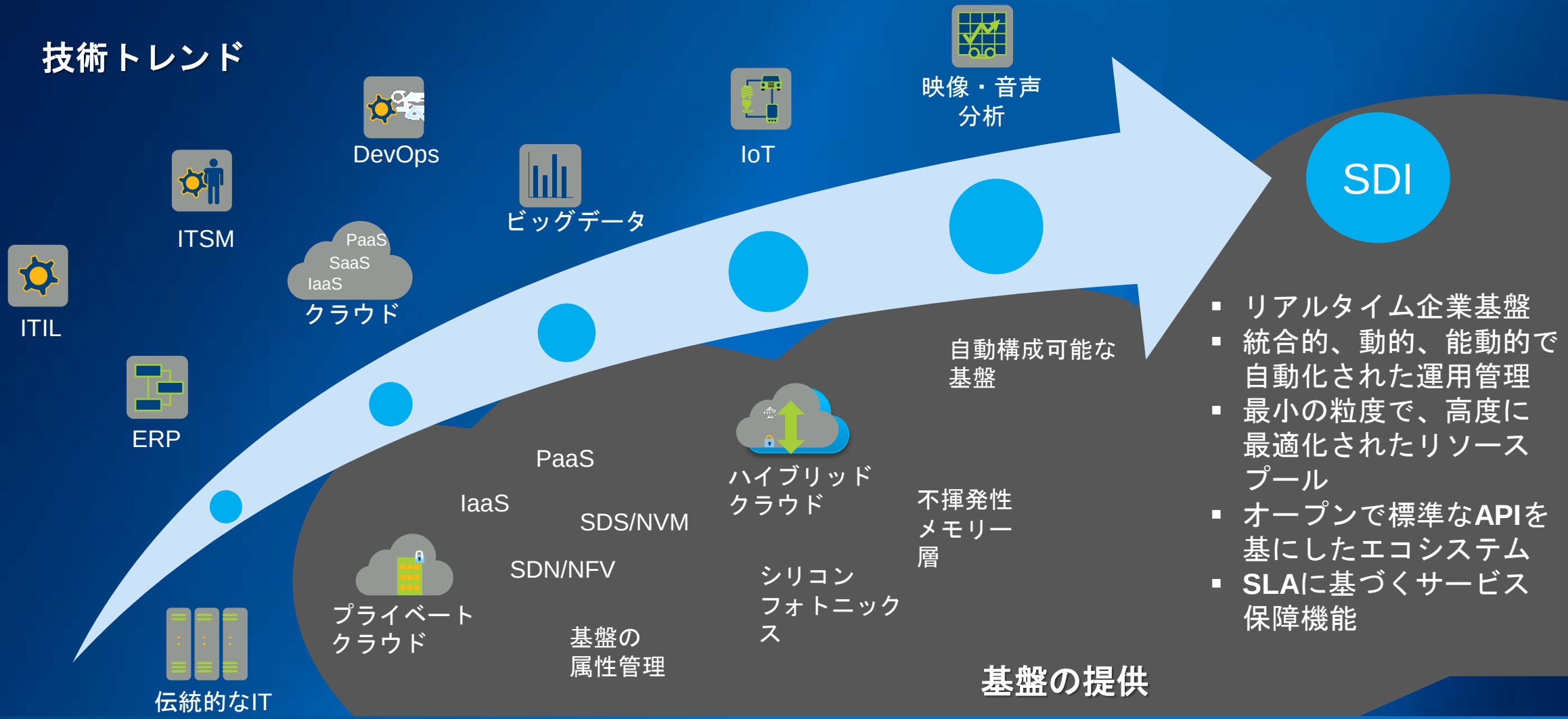
効率性の向上
サーバー使用率
15%以下→80%

生産性を約12倍に
- サーバー台数半減
- 性能6倍
- ストレージ容量11倍

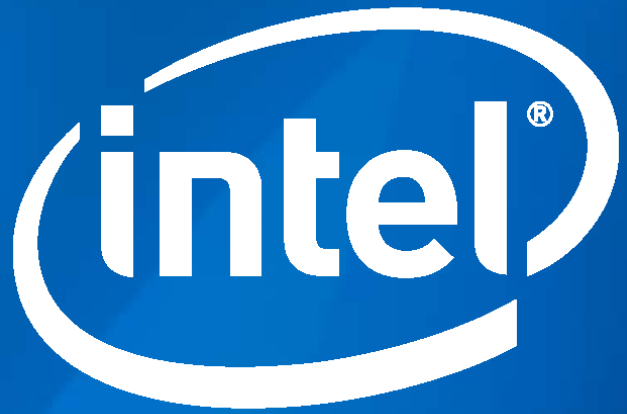
劇的な俊敏性向上
- 基盤リソース提供TPT：
  3ヵ月→数分
- IT依存からセルフサービス

過去4年間のコスト削減効果: $184M
予算をビッグデータBIへ→2014年$351M の売上に貢献

ソフトウエアー・デファインド基盤（SDI）へ向けて データセンターのアーキテクチャーの変革



Amazon Web Services & Intel



インテルのデータセンター技術に対する継続的な投資

intel inside ITANIUM

intel inside XEON

intel inside XEON PHI

intel inside CORE i5

intel inside ATOM

インテルのデータセンター技術に対する継続的な投資

	企業IT	クラウドサービス	テレコミュニケーション	高度科学技術計算
	8% CAGR	*>25% CAGR*	*>15% CAGR*	*>20% CAGR*
サーバー	CPUs, Ethernet & Infiniband Controllers, Management SW			
ネットワーク	CPUs, Accelerators, Ethernet & Infiniband Switch Silicon			
ストレージ	CPUs, Flash, Caching & RAID SW			
ソフトウエア	Hadoop, Lustre File System, Datacenter Manager, Wind River OS, API…			

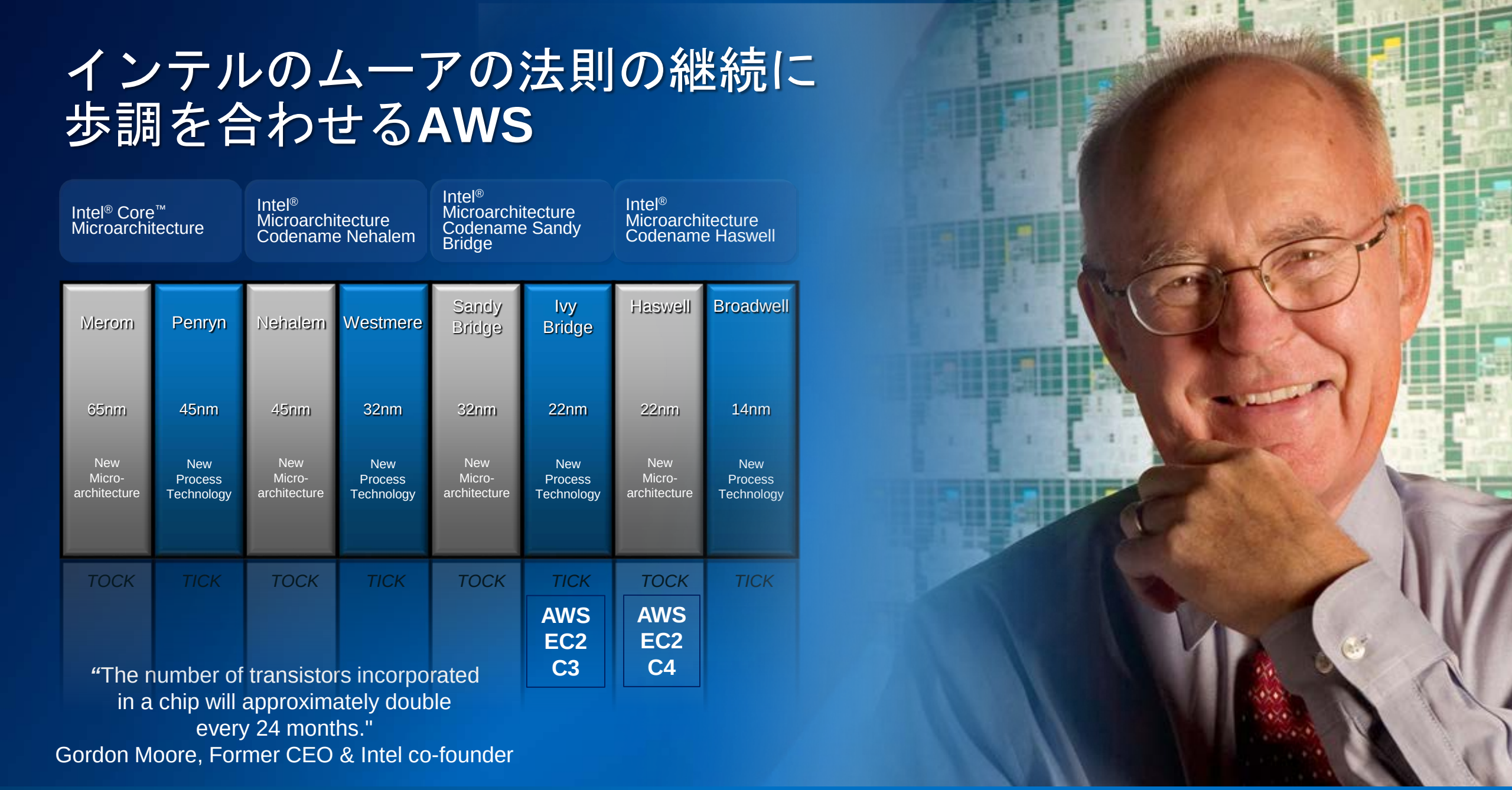
intel inside ITANIUM | intel inside XEON | intel inside XEON PHI | intel inside CORE i5 | intel inside ATOM

Source: IDC WW Server Tracker & Intel

インテルのムーアの法則の継続に歩調を合わせるAWS

Intel® Core™ Microarchitecture		Intel® Microarchitecture Codename Nehalem		Intel® Microarchitecture Codename Sandy Bridge		Intel® Microarchitecture Codename Haswell	
Merom	Penryn	Nehalem	Westmere	Sandy Bridge	Ivy Bridge	Haswell	Broadwell
65nm	45nm	45nm	32nm	32nm	22nm	22nm	14nm
New Micro-architecture	New Process Technology	New Micro-architecture	New Process Technology	New Micro-architecture	New Process Technology	New Micro-architecture	New Process Technology
TOCK	*TICK*	*TOCK*	*TICK*	*TOCK*	*TICK*	*TOCK*	*TICK*
					AWS EC2 C3	**AWS EC2 C4**	

“The number of transistors incorporated in a chip will approximately double every 24 months."
Gordon Moore, Former CEO & Intel co-founder



EC2におけるインテル技術のリスト

AWSが提供する幅広い選択肢から、ユースケースに最適化されたインスタンスを選択可能

AWS インスタンス タイプ	G2 P2 M4	C3 C4	S2 O2 D2	M3 O3 R3	I/O O3 I2	GPU G2	バースト T2
インテル®	インテル® Xeon® プロセッサー E5-2676 v3	インテル® Xeon® プロセッサー E5-2666 v3	インテル® Xeon® プロセッサー E5-2676 v3	インテル® Xeon® プロセッサー E5-2670 v2	インテル® Xeon® プロセッサー E5-2670 v2	インテル® Xeon® プロセッサー E5-2670	インテル® Xeon® プロセッサー
インテル® ハイパースレッディング・テクノロジー	22 Haswell*	22 Haswell*	22 Haswell*	22 インテル Broadwell*	22 インテル Broadwell*	32 Sandy Bridge*	✓
インテル® AVX	AVX 2.0	AVX 2.0	AVX 2.0	✓	✓	✓	✓
インテル® AES-NI	✓	✓	✓	✓	✓	✓	✓
インテル® ターボ・ブースト・テクノロジー	✓	✓	✓	✓	✓	✓	✓

* 開発コード名

AWSの顧客のメリット例

Novartis社はプレミアム・インスタンスを活用することで、コストを削減

up to
65%
Cost reduction[1]

NOVARTIS INSTITUTES FOR BIOMEDICAL RESEARCH

up to
52%
Decrease in
in run-time[1]

1 NIBR, of Novartis Pharmaceuticals ran Next Gen Sequencing, Imaging & Modeling & Sim techniques (specifically Virtual Screening w/CPU bound, low mem, low IO, network, parallel Benchmarking SW ran same job many times (workload avg 32 secs on AWS cc2.8xlarge vs 1min 7 sec on AWS m1.large) revealed that best ROI was with cc2vspot instances

Intel does not control or audit the design or implementation of third party benchmark data or Web sites referenced in this document. Intel encourages all of its customers to visit the referenced Web sites or others where similar performance benchmark data are reported and confirm whether the referenced benchmark data are accurate and reflect performance of systems available for purchase.

Software and workloads used in performance tests may have been optimized for performance only on Intel microprocessors. Performance tests, such as SYSmark and MobileMark, are measured using specific computer systems, components, software, operations and functions. Any change to any of those factors may cause the results to vary. You should consult other information and performance tests to assist you in fully evaluating your contemplated purchases, including the performance of that product when combined with other products. For more information go to http://www.intel.com/performance

AWSとインテルによるビッグデータ事例
顧客のビッグデータ分析をより身近に

Learn what our customers are able to do in 60 minutes

The opportunities exist for data to transform businesses in fields as diverse as travel, genomics, e-commerce and space exploration. They are created by the on-demand availability of the high performance Intel Xeon E5 processor family in the Amazon Web Services cloud.

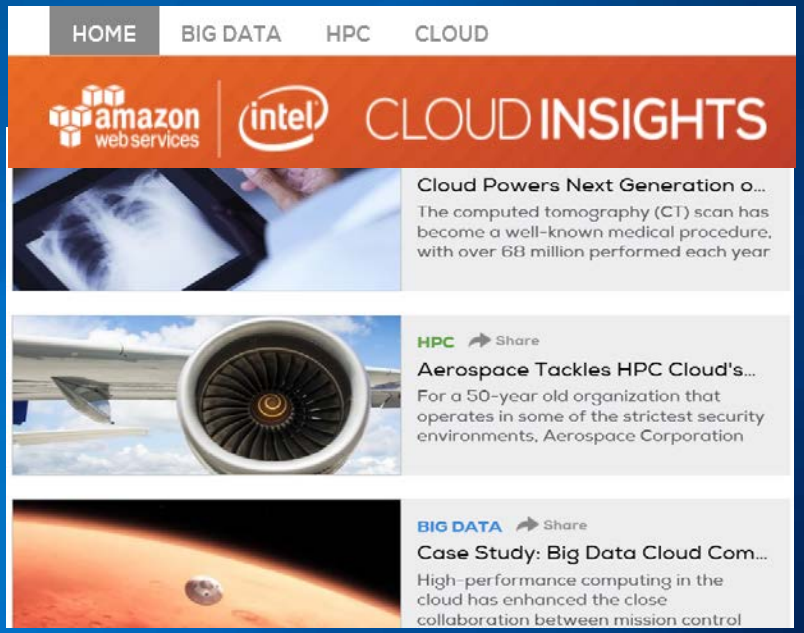
Accelerates Discovery by 840% Exploring Mars

16 Million Model Simulations an Hour

Calculates 120 Million Statistics an Hour

Analyze In-session Data and Deliver Targeted Ads

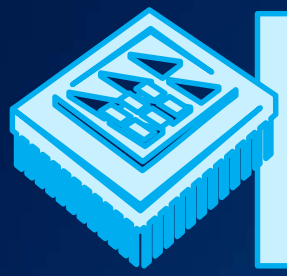
More at https://www.cloudinsights.com/Big-Data/



More at http://aws.amazon.com/intel and http://aws.amazon.com/solutions/case-studies

リアルタイムなデータハブを支えるインテルの技術

コンピュート　　ストレージ・ネットワーク



オペーレーショナル・
データハブ
(インメモリー)

スケールアウト・
データハブ

構造化
データ

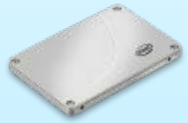
非構造化
データ

インテル® Xeon®
E7 v3 ファミリー

スケールアップ・アーキテクチャー
8ソケット以上で12TBのメモリー
インメモリー・システムに最適

インテル® Xeon®
E5 v3 ファミリー

スケールアウト・アーキテクチャー
Hadoopなどに適した性能を提供
分散分析基盤に最適



Intelligent Storage
Scale-out Storage
Scale-up Storage
Intel® SSD

Intel® Ethernet Controllers
Intel® Ethernet Adapters
Intel® Ethernet
Switch Silicon
Intel® True Scale Fabric

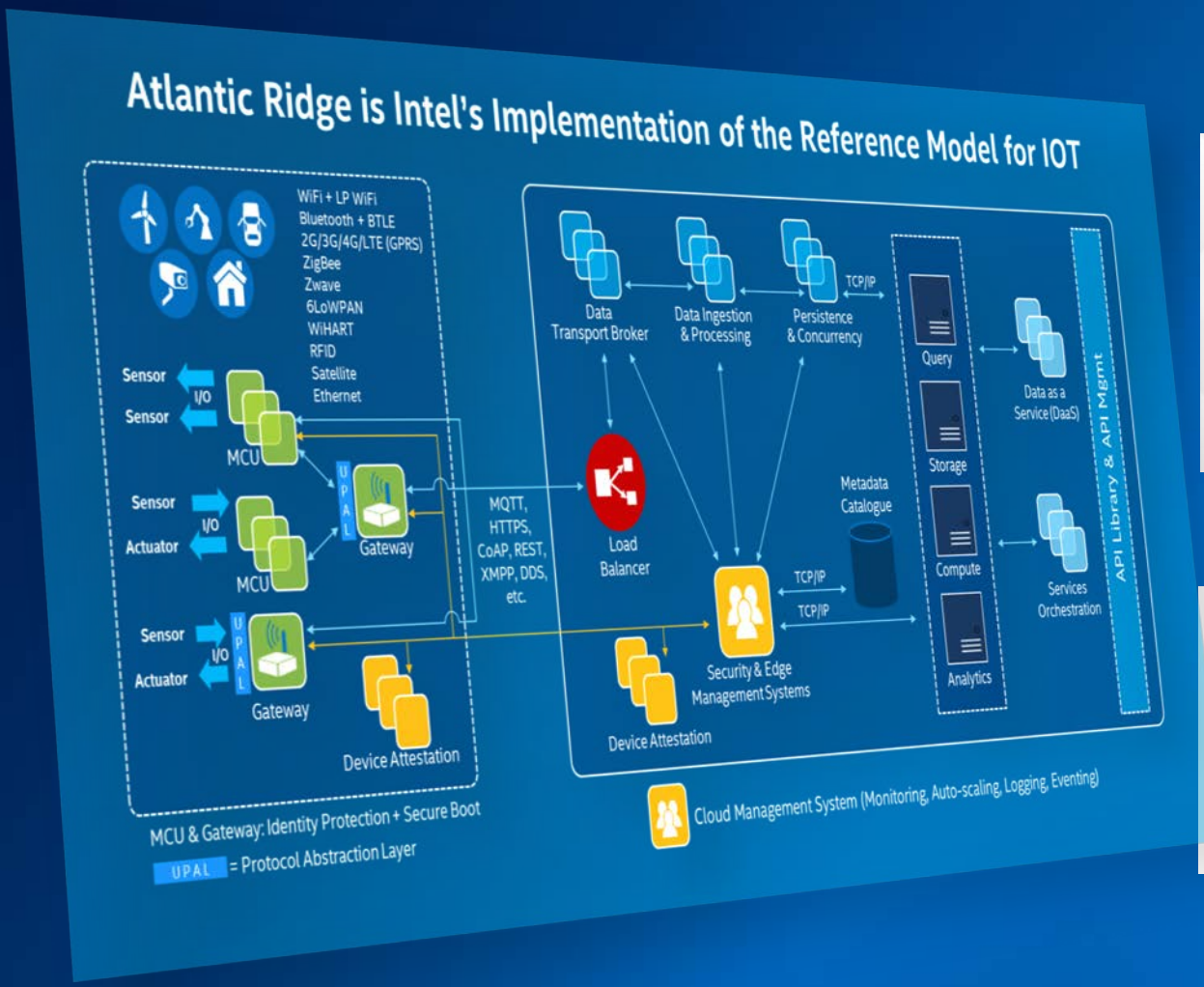
新 EC2 インスタンス「X1」を発表

- **2TB/100v CPU という大規模インスタンス**
- **4つの インテル® Xeon ® プロセッサー E7 v3を搭載**
- **SAP HANA や Apache Spark 等大規模ワークロードを支援**

X1インスタンスは来年前半に登場予定

写真： AWS re:Invent 2015

AWSとインテルによるIoT市場開拓支援



AWS Summit
TOKYO

IoTアイディアソン&ハッカソン 2015

アイディア応募	一次審査 アイディアソン参加者発表	アイディアソン 5チーム選考	開発期間	ハッカソン & 発表
応募締切 4月22日（水）	4月24日（金）	実施日 5月9日（土）		実施日 6月2日（火）

まとめ

- 環境の激変
- 成長への新たな考え方
- クラウド化への構造改革とその効果
- クラウド型基盤のさらなる進化
- **AWSとインテルの協業**

Legal Disclaimer

INFORMATION IN THIS DOCUMENT IS PROVIDED IN CONNECTION WITH INTEL PRODUCTS. NO LICENSE, EXPRESS OR IMPLIED, BY ESTOPPEL OR OTHERWISE, TO ANY INTELLECTUAL PROPERTY RIGHTS IS GRANTED BY THIS DOCUMENT. EXCEPT AS PROVIDED IN INTEL'S TERMS AND CONDITIONS OF SALE FOR SUCH PRODUCTS, INTEL ASSUMES NO LIABILITY WHATSOEVER AND INTEL DISCLAIMS ANY EXPRESS OR IMPLIED WARRANTY, RELATING TO SALE AND/OR USE OF INTEL PRODUCTS INCLUDING LIABILITY OR WARRANTIES RELATING TO FITNESS FOR A PARTICULAR PURPOSE, MERCHANTABILITY, OR INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT.
A "Mission Critical Application" is any application in which failure of the Intel Product could result, directly or indirectly, in personal injury or death. SHOULD YOU PURCHASE OR USE INTEL'S PRODUCTS FOR ANY SUCH MISSION CRITICAL APPLICATION, YOU SHALL INDEMNIFY AND HOLD INTEL AND ITS SUBSIDIARIES, SUBCONTRACTORS AND AFFILIATES, AND THE DIRECTORS, OFFICERS, AND EMPLOYEES OF EACH, HARMLESS AGAINST ALL CLAIMS COSTS, DAMAGES, AND EXPENSES AND REASONABLE ATTORNEYS' FEES ARISING OUT OF, DIRECTLY OR INDIRECTLY, ANY CLAIM OF PRODUCT LIABILITY, PERSONAL INJURY, OR DEATH ARISING IN ANY WAY OUT OF SUCH MISSION CRITICAL APPLICATION, WHETHER OR NOT INTEL OR ITS SUBCONTRACTOR WAS NEGLIGENT IN THE DESIGN, MANUFACTURE, OR WARNING OF THE INTEL PRODUCT OR ANY OF ITS PARTS.
Intel may make changes to specifications and product descriptions at any time, without notice. Designers must not rely on the absence or characteristics of any features or instructions marked "reserved" or "undefined". Intel reserves these for future definition and shall have no responsibility whatsoever for conflicts or incompatibilities arising from future changes to them. The information here is subject to change without notice. Do not finalize a design with this information.
The products described in this document may contain design defects or errors known as errata which may cause the product to deviate from published specifications. Current characterized errata are available on request.
Contact your local Intel sales office or your distributor to obtain the latest specifications and before placing your product order.
Copies of documents which have an order number and are referenced in this document, or other Intel literature, may be obtained by calling 1-800-548-4725, or go to: http://www.intel.com/design/literature.htm

Xeon, Phi and other code names featured are used internally within Intel to identify products that are in development and not yet publicly announced for release. Customers, licensees and other third parties are not authorized by Intel to use code names in advertising, promotion or marketing of any product or services and any such use of Intel's internal code names is at the sole risk of the user
Intel, Look Inside, and the Intel logo are trademarks of Intel Corporation in the United States and other countries.

*Other names and brands may be claimed as the property of others.

Risk Factors

The above statements and any others in this document that refer to plans and expectations for the third quarter, the year and the future are forward-looking statements that involve a number of risks and uncertainties. Words such as “anticipates,” “expects,” “intends,” “plans,” “believes,” “seeks,” “estimates,” “may,” “will,” “should” and their variations identify forward-looking statements. Statements that refer to or are based on projections, uncertain events or assumptions also identify forward-looking statements. Many factors could affect Intel’s actual results, and variances from Intel’s current expectations regarding such factors could cause actual results to differ materially from those expressed in these forward-looking statements. Intel presently considers the following to be the important factors that could cause actual results to differ materially from the company’s expectations. Demand could be different from Intel's expectations due to factors including changes in business and economic conditions; customer acceptance of Intel’s and competitors’ products; supply constraints and other disruptions affecting customers; changes in customer order patterns including order cancellations; and changes in the level of inventory at customers. Uncertainty in global economic and financial conditions poses a risk that consumers and businesses may defer purchases in response to negative financial events, which could negatively affect product demand and other related matters. Intel operates in intensely competitive industries that are characterized by a high percentage of costs that are fixed or difficult to reduce in the short term and product demand that is highly variable and difficult to forecast. Revenue and the gross margin percentage are affected by the timing of Intel product introductions and the demand for and market acceptance of Intel's products; actions taken by Intel's competitors, including product offerings and introductions, marketing programs and pricing pressures and Intel’s response to such actions; and Intel’s ability to respond quickly to technological developments and to incorporate new features into its products. The gross margin percentage could vary significantly from expectations based on capacity utilization; variations in inventory valuation, including variations related to the timing of qualifying products for sale; changes in revenue levels; segment product mix; the timing and execution of the manufacturing ramp and associated costs; start-up costs; excess or obsolete inventory; changes in unit costs; defects or disruptions in the supply of materials or resources; product manufacturing quality/yields; and impairments of long-lived assets, including manufacturing, assembly/test and intangible assets. Intel's results could be affected by adverse economic, social, political and physical/infrastructure conditions in countries where Intel, its customers or its suppliers operate, including military conflict and other security risks, natural disasters, infrastructure disruptions, health concerns and fluctuations in currency exchange rates. Expenses, particularly certain marketing and compensation expenses, as well as restructuring and asset impairment charges, vary depending on the level of demand for Intel's products and the level of revenue and profits. Intel’s results could be affected by the timing of closing of acquisitions and divestitures. Intel's results could be affected by adverse effects associated with product defects and errata (deviations from published specifications), and by litigation or regulatory matters involving intellectual property, stockholder, consumer, antitrust, disclosure and other issues, such as the litigation and regulatory matters described in Intel's SEC reports. An unfavorable ruling could include monetary damages or an injunction prohibiting Intel from manufacturing or selling one or more products, precluding particular business practices, impacting Intel’s ability to design its products, or requiring other remedies such as compulsory licensing of intellectual property. A detailed discussion of these and other factors that could affect Intel’s results is included in Intel’s SEC filings, including the company’s most recent reports on Form 10-Q, Form 10-K and earnings release.

Rev. 7/17/13