Cloud Adoption: Trends and Recommendations

SecTor 2019

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Principal Analyst
Step 1: Choose an Amazon Machine Image (AMI)

An AMI is a template that contains the software configuration (operating system, application server, and applications) required to launch your instance. You can select an AMI provided by AWS or select one of your own AMIs.

Search for an AMI by entering a search term e.g. "Windows"

Quick Start

- **Amazon Linux 2 AMI (HVM), SSD Volume Type**: ami-0b69ea68ff7391e80 (64-bit x86) / ami-09c61c4850b7465cb (64-bit ARM)
  - Amazon Linux 2 comes with five-year support. It provides Linux kernel 4.14 tuned for optimal performance on Amazon EC2, systemd 219, the latest software packages through extras.
  - Root device type: ebs  Virtualization type: hvm  ENA Enabled: Yes

- **Amazon Linux AMI 2018.03.0 (HVM), SSD Volume Type**: ami-00eb20669e0990cb4
  - The Amazon Linux AMI is an EBS-backed, AWS-supported image. The default image includes AWS command line tools, Python, Ruby, Perl, Docker, PHP, MySQL, PostgreSQL, and other packages.
  - Root device type: ebs  Virtualization type: hvm  ENA Enabled: Yes

- **Red Hat Enterprise Linux 8 (HVM), SSD Volume Type**: ami-0c322300a1dd5dc79 (64-bit x86) / ami-03587fa4048e9eb
  - Red Hat Enterprise Linux version 8 (HVM), EBS General Purpose (SSD) Volume Type
  - Root device type: ebs  Virtualization type: hvm  ENA Enabled: Yes

- **SUSE Linux Enterprise Server 15 SP1 (HVM), SSD Volume Type**: ami-0b5372ab3202bd20b (64-bit x86) / ami-0072a110
Campaigns

The 2019 Last Week in AWS Charity T-Shirt: Ay-Em-I
All proceeds benefit St. Jude Children’s Research Hospital

The 2019 Last Week in AWS Charity T-Shirt: AH-Mee
All proceeds benefit St. Jude Children’s Research Hospital

https://www.customink.com/fundraising/lastweekinaws
Does it matter?
Introduction

Principal Analyst, Information Security team
Originally from 🇧🇷, now based in Toronto 🇨🇦

Topic areas: cloud security, endpoint, deception, anti-fraud.

Prior experience: 25+ years across pre-sales, delivery and consulting roles in enterprise security.

Interests: security economics, security at scale

@fsmontenegro
Agenda

• Introduction and Methodology
• Broader Cybersecurity Trends
• Cloud Adoption Trends
• DevOps
• Cloud Security Trends
• Recommendations
Methodology

“451 Voice of the Enterprise”

Quarterly insights:
- Budgets & Insights
- Workloads & Projects
- Organizational Dynamics
- Vendor Evaluations

Briefings, Inquiries, Research

100s of hours
- Enterprise IT
- Service Providers
- Security vendors
- Finance professionals

Qualitative research
Independent
Doing a little tuning on my webinars and looking for clues as to audience needs. When you join a webinar that has an industry analyst presenting content related to a topic, do you prefer that content to be primarily:

<table>
<thead>
<tr>
<th>Relevant industry trends</th>
<th>42%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concepts about the topic</td>
<td>19%</td>
</tr>
<tr>
<td>Analyst recommendations</td>
<td>27%</td>
</tr>
<tr>
<td>Other/All/results/comment</td>
<td>12%</td>
</tr>
</tbody>
</table>

26 votes · Final results

6:18 PM · Oct 1, 2019 · Twitter Web App
“All models are wrong, but some are useful”

George Box

• Introduction and Methodology
• Broader Cybersecurity Trends
• Cloud Adoption Trends
• DevOps
• Cloud Security Trends
• Recommendations
Strategy Cycle (Sun Tzu and Simon Wardley)
Clima[c]tic Pattern: Evolution

Monolithic -> Microservices
Self-contained -> Service mesh
APIs -> ‘Functions as a Service’
Waterfall -> Agile
IT -> DevOps
Datacenter -> Cloud
Enterprise -> IoT, OT, consumer
Networks -> 5G
All eyes on security!

Q17. Which of the following represent the most important workload-related IT challenges your organization faces at the moment?

- Data protection and security: 60%
- Governance and compliance: 37%
- Migrating workloads to new IT environments: 31%
- Incorporating new workloads into the IT environment: 25%
- Ongoing capacity planning: 23%
- Cost tracking/management: 23%
- Lack of workload-specific staff/expertise: 23%
- Maintaining visibility across different IT environments: 21%
- Other: 3%

Source: 451 Research, Voice of the Enterprise: Digital Pulse, Workloads & Key Projects 2019
## Security: Seen in context

**IT Spending Categories Slated for Largest Budget Changes in 2018**

<table>
<thead>
<tr>
<th>Category</th>
<th>Largest budget decrease area (n=771)</th>
<th>Largest budget increase area (n=847)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off-premises cloud services</td>
<td>4%</td>
<td>25%</td>
</tr>
<tr>
<td>Information security</td>
<td>1%</td>
<td>17%</td>
</tr>
<tr>
<td>IT staff/labor costs</td>
<td>14%</td>
<td>13%</td>
</tr>
<tr>
<td>Applications/application software</td>
<td>4%</td>
<td>12%</td>
</tr>
<tr>
<td>Datacenter facilities (including colocation)</td>
<td>15%</td>
<td>5%</td>
</tr>
<tr>
<td>Converged/hyperconverged infrastructure</td>
<td>2%</td>
<td>4%</td>
</tr>
<tr>
<td>Internet of Things (IoT)</td>
<td>1%</td>
<td>4%</td>
</tr>
<tr>
<td>Storage</td>
<td>5%</td>
<td>4%</td>
</tr>
<tr>
<td>Networking</td>
<td>5%</td>
<td>3%</td>
</tr>
<tr>
<td>Other</td>
<td>2%</td>
<td>3%</td>
</tr>
<tr>
<td>Servers</td>
<td>18%</td>
<td>2%</td>
</tr>
</tbody>
</table>

Source: 451 Research’s Voice of the Enterprise: Digital Pulse, Workloads and Key Projects 2018
By what percentage do you expect your organization’s total information security budget to change in the coming year compared to this year?

• Introduction and Methodology
• Broader Cybersecurity Trends
• **Cloud Adoption Trends**
• DevOps
• Cloud Security Trends
• Recommendations
Q20. Which of the following best describe the primary purpose of the current/planned digital transformation initiatives?

- Customer experience: 44%
- Data-driven business intelligence and analytics: 43%
- Delivery of new digital products and services: 42%
- Process automation: 36%
- Employee productivity: 30%
- Developing new digital business/revenue streams: 29%
- Innovation/enhancement of existing products (e.g., remote diagnostics/updates): 28%
- Supply chain optimization: 11%
- Other: 3%

Source: 451 Research, Voice of the Enterprise: Digital Pulse, Workloads & Key Projects 2019
**Are they seeing results? Oh yes…**

<table>
<thead>
<tr>
<th>Benefit</th>
<th>% of Respondents (n=250)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faster time to market for new products</td>
<td>45%</td>
</tr>
<tr>
<td>Improved employee productivity</td>
<td>42%</td>
</tr>
<tr>
<td>Reduced operating expenses</td>
<td>36%</td>
</tr>
<tr>
<td>Improved customer satisfaction</td>
<td>25%</td>
</tr>
<tr>
<td>Extended geographic reach</td>
<td>25%</td>
</tr>
<tr>
<td>Fewer security/data leakage incidents</td>
<td>15%</td>
</tr>
<tr>
<td>Increased revenue</td>
<td>12%</td>
</tr>
<tr>
<td>Improved availability of cash</td>
<td>9%</td>
</tr>
<tr>
<td>Increased gross margins</td>
<td>8%</td>
</tr>
<tr>
<td>Reduced customer churn</td>
<td>6%</td>
</tr>
<tr>
<td>Reduction in debt/borrowing</td>
<td>4%</td>
</tr>
<tr>
<td>We haven’t experienced any benefits</td>
<td>18%</td>
</tr>
</tbody>
</table>

Source: 451 Research’s Voice of the Enterprise: Cloud, Hosting & Managed Services, Organizational Dynamics 2019

**Q15. Which of the following benefits, if any, has your organization experienced as a result of your use of cloud services?**
Cloud transformations are ongoing

Q: Thinking about all of your organization’s workloads/applications, where are the majority of these currently deployed?

Q: Thinking about all of your organization’s workloads/applications, where will the majority of these be deployed two years from now?

Q4. What percent of your organization’s overall IT budget (including infrastructure, software, and vendor fees) is spent on IaaS/PaaS/public cloud resources?

Approximate percentage of overall IT budget spent on IaaS/PaaS/public cloud

All respondents who use IaaS/PaaS/public cloud

<table>
<thead>
<tr>
<th>Percentage</th>
<th>respondents (n=80)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-25%</td>
<td>61%</td>
</tr>
<tr>
<td>26-50%</td>
<td>29%</td>
</tr>
<tr>
<td>51-75%</td>
<td>9%</td>
</tr>
<tr>
<td>76-100%</td>
<td>1%</td>
</tr>
</tbody>
</table>

Mean = 23%
Median = 20%

Source: 451 Research’s Voice of the Enterprise: Cloud, Hosting & Managed Services, Organizational Dynamics 2019
Expected change in public cloud spending in next 12 months

All respondents who use IaaS/PaaS/public cloud

- Significant increase: 22%
- Slight increase: 57%
- Remain the same: 18%
- Slight decrease: 2%
- Significant decrease: 1%

Source: 451 Research's Voice of the Enterprise: Cloud, Hosting & Managed Services, Organizational Dynamics 2019
“Well, private is cheaper!”... not quite
“People are migrating back!”…. Not quite...

- Yes, to a hosted private cloud environment: 5%
- Yes, to an on-premises private cloud environment: 2%
- Yes, to a non-cloud environment: 2%
- No: 92%

Source: 451 Research, Voice of the Enterprise: Cloud, Hosting & Managed Services, Workloads and Key Projects 2019
• Introduction and Methodology
• Broader Cybersecurity Trends
• Cloud Adoption Trends
• DevOps
• Cloud Security Trends
• Recommendations
Q2. In the last 12 months, how often did you deploy most software applications to production?


<table>
<thead>
<tr>
<th>Frequency</th>
<th>% of Respondents (n=427)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hourly</td>
<td>5%</td>
</tr>
<tr>
<td>Daily</td>
<td>19%</td>
</tr>
<tr>
<td>Weekly</td>
<td>25%</td>
</tr>
<tr>
<td>Monthly</td>
<td>23%</td>
</tr>
<tr>
<td>Quarterly</td>
<td>19%</td>
</tr>
<tr>
<td>Semi-Annually</td>
<td>6%</td>
</tr>
<tr>
<td>Annually</td>
<td>3%</td>
</tr>
</tbody>
</table>

Organization has deployed software applications to production in the last 12 months
Q8. For which types of applications does your organization take a DevOps approach?

Q10b. What are/were the primary challenges of spreading DevOps to more of your applications, releases and teams?

Barriers to Spreading DevOps More Widely

All respondents

Q12. Which best describes your DevOps process?

- All sanctioned and centrally managed: 43%
- All sanctioned but distributed management (e.g., within different business units): 47%
- Some sanctioned and centrally managed, but some unsanctioned and/or distributed: 10%


Structure of DevOps Process – Distributed is Way to Go
Q15. What cultural challenges, if any, has your organization’s DevOps team(s) confronted?

- Overcoming resistance to change: 33%
- Aligning differing priorities for stakeholders and teams: 31%
- Promoting communication between teams not accustomed to working together: 30%
- Sharing responsibility for problems: 28%
- Demonstrating equity of benefits/costs: 27%
- Down support (management, leadership, etc.): 25%
- Up support (developers, sysadmins, etc.): 23%
- Breaking down silos for collaboration: 22%
- None of the above: 6%
- Don’t know: 2%

"The most innovative companies and highest-performing organizations are always striving to be better..."

<table>
<thead>
<tr>
<th></th>
<th>Elite</th>
<th>High</th>
<th>Medium</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lead time for changes</strong></td>
<td>&lt; One day</td>
<td>1 day – 1 week</td>
<td>1 week – 1 month</td>
<td>1 month – 6 months</td>
</tr>
<tr>
<td><strong>Release frequency</strong></td>
<td>On demand (&gt;1 daily)</td>
<td>1 per day – 1 per month</td>
<td>1 per week – 1 per month</td>
<td>1 per month – 1 per 6 months</td>
</tr>
<tr>
<td><strong>Time to recovery</strong></td>
<td>&lt; 1 hour</td>
<td>&lt; 1 day</td>
<td>&lt; 1 day</td>
<td>1 week – 1 month</td>
</tr>
<tr>
<td><strong>Change failure rate</strong></td>
<td>0% – 15%</td>
<td>0% – 15%</td>
<td>0% – 15%</td>
<td>46% – 60%</td>
</tr>
</tbody>
</table>

From: Forsgren & Shortridge, BH USA 2019
Q16. Which environment(s) does your organization use for your DevOps implementation?

- On-premises private cloud: 49%
- Hosted private cloud: 38%
- On-premises, non-cloud infrastructure: 32%
- Infrastructure as a service (IaaS)/public cloud: 26%
- Software as a service (SaaS) and hosted applications: 21%
- Hosted, non-cloud infrastructure: 19%
- Platform as a service (PaaS): 18%
- Other: 18%
- Don’t know: 19%

Q32. Which cloud-native technologies and methodologies are important to your organization?

- Microservices: 46%
- Containers: 41%
- Serverless: 28%
- Service mesh: 26%
- Kubernetes: 24%
- None of the above: 5%
- Don't know: 6%

Source: 451 Research, Voice of the Enterprise: Q1 2019 VoTE DevOps survey
Q28. How important is open source software to your organization’s DevOps implementation?

- Very important: 46%
- Somewhat important: 44%
- Not very important: 8%
- Not at all important: 2%

Q35. What percentage of your overall application portfolio is developed using cloud-native technology and methodology?

• Introduction and Methodology
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Q23. Which of the following skills categories are most important for managing your organization’s cloud computing environment?

- Security expertise: 66%
- Cloud platform expertise: 61%
- Compliance/governance: 49%
- DevOps: 47%
- Cloud orchestration and management: 45%
- Cloud architect: 45%
- Cloud server/storage administration: 41%
- Cloud provider management: 39%
- Cloud-native programming: 26%
- Software-defined networking: 21%
- Database administration: 20%
- Machine or deep learning: 14%
- Open source software development: 13%
- Other: 2%

Source: 451 Research’s Voice of the Enterprise: Cloud, Hosting & Managed Services, Organizational Dynamics 2019
Yet organizations struggle to be prepared

Q24. And which of the following skills categories are most acutely lacking when it comes to managing your organization’s cloud computing environment?

- Security expertise: 36%
- Cloud architect: 34%
- Cloud orchestration and management: 31%
- Cloud platform expertise: 27%
- DevOps: 24%
- Compliance/governance: 22%
- Cloud-native programming: 22%
- Machine or deep learning: 20%
- Cloud provider management: 19%
- Cloud server/storage administration: 16%
- Software-defined networking: 14%
- Open source software development: 11%
- Database administration: 8%
- Other: 4%

Source: 451 Research’s Voice of the Enterprise: Cloud, Hosting & Managed Services, Organizational Dynamics 2019 % of respondents (n=450)
Q19. Beyond developers and IT operations, who are the primary stakeholders in your DevOps implementation?

Q22. What is the most critical security element to your DevOps workflows?

Security Elements Critical to DevOps Workflows

- **Static analysis**: 11%
- **Dynamic analysis**: 15%
- **Interactive analysis**: 14%
- **Software composition analysis**: 14%
- **Vulnerability assessment**: 30%
- **Software supply chain validation**: 15%
- **Other**: 1%


Q22. What is the most critical security element to your DevOps workflows?
Groups involved in public cloud spending decisions

All respondents who use IaaS/PaaS/public cloud

Source: 451 Research’s Voice of the Enterprise: Cloud, Hosting & Managed Services, Organizational Dynamics 2019

Q12. Which of the following groups are involved in or influence public cloud spending decisions at your organization?
Q23. What percentage of your DevOps workflow implementations include security elements?

None (0%) 1%
1-9% 2%
10-19% 7%
20-29% 13%
30-39% 14%
40-49% 11%
50-59% 15%
60-69% 9%
70-79% 8%
80-89% 5%
90-99% 6%
100% 10%

% of Respondents (n=478)


Q23. What percentage of your DevOps workflow implementations include security elements?
• Introduction and Methodology
• Broader Cybersecurity Trends
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• Recommendations
Strategy -> Doctrine

<table>
<thead>
<tr>
<th>Doctrine (Universal)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Focus on user needs</td>
</tr>
<tr>
<td>Remove bias and duplication</td>
</tr>
<tr>
<td>Optimise flow</td>
</tr>
<tr>
<td>Learn by playing the game</td>
</tr>
<tr>
<td>Challenge assumptions</td>
</tr>
<tr>
<td>Use small and autonomous teams</td>
</tr>
<tr>
<td>Design for constant evolution</td>
</tr>
</tbody>
</table>
Security for Cloud & DevOps

Support cloud teams, not just ‘no’

Don’t duplicate security

Work within their processes

Iterate & improve

Avoid “always did this way”

Work with project teams

Optimize for change

Focus on user needs

Use appropriate methods

Use right tooling

Remove bias and duplication

Fast, inexpensive, simple and TINY

Security with every change

Optimise flow

Use standard components where appropriate

Use platform when you can

Learn by playing the game

Use a common language

“Defects” and “incidents”

Challenge assumptions

Strategy is iterative not linear

Support for improvement

Use small and autonomous teams

Think aptitude and attitude

Align tasks to motivation

Design for constant evolution

Mastery, Purpose and Autonomy

Enable self-sufficiency
Next steps -> Leadership & Act

• Must evaluate steps on your own
  • Individual, departmental, organizational

• Expect – indeed plan for – failure and iteration
In closing

• Cloud adoption uneven, nuanced but unwavering
• DevOps adoption growing, uneven, nuanced
• Security is top of mind in both trends
• Path forward for security is alignment, not conflict

• Parting (provocative?) thought:
  • THIS is how we close “cybersecurity skills shortage”
Thank you

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San Francisco
Additional Resources

- Shortridge & Forsgren BlackHat USA 2019
- Accelerate – Forsgren, Humble and Kim
- Cloudsecurityforum.slack.com
- Veracode State of Software Security Report Vol.9

Source: Veracode S055 Volume 9