

WinterGreen Research, INC.

3

Sea Change Series: Orchestration Software in the Mega Data Center

**Mega Data Center Depends on Orchestration Software to Control Operations,
Implement Microservices**



WinterGreen Research, Inc.

Lexington, Massachusetts

www.wintergreenresearch.com

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REPORT # SH27005197

115 PAGES

75 TABLES AND FIGURES

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Abstract: Orchestration Software Automates Data Center Infrastructure

The four superstar companies that are able to leverage IT to achieve growth, Microsoft, Google, Facebook, and the leader AWS all use Clos architecture. What is significant is that systems have to hit a certain scale before Clos networks work. Clos networks are what work now for flexibility and supporting innovation in an affordable manner. Orchestration software is used to create the infrastructure and application layers in the data center. Orchestration software supports nonblocking architecture so that any node can communicate with any other node.

About the Sea Change Series:

Sea Change Series from WinterGreen Research is targeted to C-Level Executives and addresses mammoth change in some market. This study is one of the data center Sea Change series of 25 modules that address the changes coming as enterprise data centers become obsolete and are replaced not just by cloud computing, but by mega data center cloud computing as is currently configured by Amazon Web Services, Google, and Microsoft.

Category 5 Ethernet cable is spread throughout the existing enterprise data centers and utilized by the servers that achieve data communications using that cable. The servers and cable are a problem, the cable is too slow to handle all the data coming at us in the new digital age, and the associated technology that operates at Ethernet category 5 cable speeds is too slow as well, this is why the entire set of existing enterprise data centers is a bottleneck.

CHECK OUT THESE KEY TOPICS

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As More Digital Data is Generated and Processed, Business Systems Move to the Cloud, But Not All Cloud is the Same, Mega Data Centers Provide Economies of Scale

Orchestration Software In The Mega Data Center
Realign IT Cost Structure
Mega Datacenter Physical Infrastructure
Automation of Mega Data Center
Networking Fabric
Exchange Of Data Between Servers
Complex Automation Of Process
Applications Customized For Each User
Machine-To-Machine
Management of Traffic Growth
Fabric Network Topology
Building-Wide Connectivity
Highly Modular Data Center Design

Scale Capacity
Back-End Service Tiers
Applications Scaling
Mega Data Center Network Fabric
Next-Generation Data Center Network Design
Pod Unit of Network
Mega Data Center Server Pods
Non-Blocking Network Architecture
Data Center Auto Discovery
Large-Scale Network
Rapid Deployment
Architecture
Expedites Provisioning And Changes
Programmable Access To Network Stack

Software Defined Networking (SDN)-Supports Scale and Automation
Compute Engine Load Balancing
Load Balanced Requests
Architecture
Scale-Out: Server And Storage Expansion
Switches and Routers
Deployed in Fabrics
Mega Data Center
Multipathing
Routing Destinations
Clos Topology Network
Capacity Scalability
Aggregation Switches
Intelligent Cloud Platform
Linux For Azure

Mega Data Center Scale to 100,000 Processors and 100,001 Switches Market Analysis:

Orchestration Software Automates Data Center Infrastructure

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LEXINGTON, Massachusetts (April 25, 2017) – The 2017 module has 115 pages and 74 tables and figures. Orchestration Software in the Mega Data Center is used to tie a fabric architecture together that fills up an entire building with 100,000 processors and 100,001 switches. The mega data center described in the study is effective because it leverages the economies of scale. This orchestration software infrastructure study module is part of a longer study that addresses the business issues connected with data center modernization. There are 26 module parts to the larger study comprised of detailed analysis of how new infrastructure layers will work to support management of vast quantities of data.

Business growth depends on technology spending. Intelligent, automated process, not manual labor systems are what speed business growth. We have had the situation in the data center where 93% of spending is just to keep current systems running, many of those plagued with manual input. Mega data centers change that pattern of IT manual process.

The Internet has grown by a factor of 100 over the past 10 years. To accommodate that growth, mega data centers have evolved to provide processing at scale. Facebook for one, has increased the corporate data center compute capacity by a factor of 1,000, virtually eliminating much manual process. Orchestration software is a key aspect of that process. To meet future demands on the Internet over the next 10 years, companies with that capacity need to increase capacity by the same amount again while the other companies struggle to catch up. Nobody really knows how to get to increasing compute capacity by another factor of 1,000.

Business growth depends on technology spending. Intelligent, automated process, not manual labor systems are what speed business growth. We have had the situation in the data center where 93% of spending is just to keep current systems running, many of those plagued with manual input. Mega data centers change that pattern of IT manual process.

Realigning data center cost structures is a core job of orchestration software. The enterprise data centers and many cloud infrastructure operations all have similar problems of being mired in administrative expense. Containers address that issue by creating vastly more efficient operations for data center infrastructure.

According to Susan Eustis, lead author of the team that prepared the study, “The only way to realign cost structure is to automate infrastructure management and orchestration. Mega data centers automate server and connectivity management using orchestration software to manage multiple application containers. Other systems automate switching and storage, along with hypervisor, operating system, and virtual machine provisioning. “

As IT relies more on virtualization and cloud mega data center computing, the physical infrastructure is flexible and agile enough to support the virtual infrastructure. Comprehensive infrastructure management and orchestration is essential.

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The Enterprise Data Center has become a bottleneck, it needs to be completely replaced. Category 5 and Category 6 Ethernet cable is spread throughout the existing enterprise data centers and is too slow to handle all the digital data coming through the data center. Cat 5 and Cat 6 Ethernet utilized by the servers to achieve data transport using that cable does not keep up with the data coming through the data center the way optical cable and optical transceivers do.

The existing servers and cable are a problem because they are too slow for modern systems. The cable is too slow to handle all the data coming at us in the new digital age, and the associated technology that operates at Ethernet category 5 and category 6 cable speeds is too slow as well, this is why the entire set of existing enterprise data centers is a bottleneck.

Mobile data traffic is set to increase by a factor of eight between 2015 and 2020. Growth is anticipated at 53 percent per year, faster than systems revenue or industry revenue.

The theme of this study is that the pace of data expansion creates the need for more modern means of managing data. There are some companies that are doing a better job, better than others of adapting to IT infrastructure to the wild influx of data.

The four superstar companies that are able to leverage IT to achieve growth, Microsoft, Google, Facebook, and the leader AWS all use Clos architecture. What is significant is that systems have to hit a certain scale before Clos networks work. Clos networks are what work now for flexibility and supporting innovation in an affordable manner. There is no dipping your toe in to try the system to see if it will work, it will not and then the IT says, "We tried that, we failed," but what the executive needs to understand is that scale matters. A little mega data center does not exist. Only scale works.

Many companies are using digital technology to create market disruption. Amazon, Uber, Google, IBM, and Microsoft represent companies using effective strategic positioning that protects the security of the data. As entire industries shift to the digital world, once buoyant companies are threatened with disappearing. A digital transformation represents an approach that enables organizations to drive changes in their business models and ecosystems leveraging cloud computing, and not just hyperscale systems but leveraging mega data centers. Just as robots make work more automated, so also cloud based communications systems implement the IoT digital connectivity transformation.

WinterGreen Research is an independent research organization funded by the sale of market research studies all over the world and by the implementation of ROI models that are used to calculate the total cost of ownership of equipment, services, and software. The company has 35 distributors worldwide, including

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Global Information Info Shop, Market Research.com, Research and Markets, electronics.ca, and Thompson Financial. It conducts its business with integrity.

The increasingly global nature of science, technology and engineering is a reflection of the implementation of the globally integrated enterprise. Customers trust wintergreen research to work alongside them to ensure the success of the participation in a particular market segment.

WinterGreen Research supports various market segment programs; provides trusted technical services to the marketing departments. It carries out accurate market share and forecast analysis services for a range of commercial and government customers globally. These are all vital market research support solutions requiring trust and integrity.

Key words: Scale In The Mega Data Center , Realign IT Cost Structure, Mega Datacenter Physical Infrastructure, Automation of Mega Data Center , Networking Fabric, Exchange Of Data Between Servers , Complex Automation Of Process, Applications Customized For Each User, Machine-To-Machine Management of Traffic Growth, Fabric Network Topology, Building-Wide Connectivity, Highly Modular Data Center Design , Scale Capacity, Back-End Service Tiers , Applications Scaling , Mega Data Center Network, Fabric Next-Generation Data Center Network Design, Pod Unit of Network, Mega Data Center Server Pods, Non-Blocking Network Architecture, Data Center Auto Discovery, Large-Scale Network, Rapid Deployment Architecture, Expedites Provisioning And Changes, Programmable Access To Network Stack , Software Defined Networking (SDN)-Supports Scale and Automation, Compute Engine Load Balancing, Load Balanced Requests Architecture, Scale-Out: Server And Storage Expansion, Switches and Routers Deployed in Fabrics, Mega Data Center Multi-pathing, Routing Destinations, Clos Topology Network , Capacity Scalability, Aggregation Switches, Intelligent Cloud Platform, Linux For Azure,

Companies Profiled

Market Leaders

Amazon
Microsoft

Google
Facebook

Orchestration Software Automates Data Center Infrastructure

Report Methodology

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This is the 700th report in a series of primary market research reports that provide senior executive analysis in communications, telecommunications, the Internet, computer, software, telephone equipment, health equipment, and energy. Automated process and significant growth potential are a priority in topic selection. The project leaders take direct responsibility for writing and preparing each report. They have significant experience preparing industry studies. They are supported by a team, each person with specific research tasks and proprietary automated process database analytics. Forecasts are based on primary research and proprietary data bases.

The primary research is conducted by talking to customers, distributors and companies. The survey data is not enough to make accurate assessment of market size, so WinterGreen Research looks at the value of shipments and the average price to achieve market assessments. Our track record in achieving accuracy is unsurpassed in the industry. We are known for being able to develop accurate market shares and projections. This is our specialty.

The analyst process is concentrated on getting good market numbers. This process involves looking at the markets from several different perspectives, including vendor shipments. The interview process is an essential aspect as well. We do have a lot of granular analysis of the different shipments by vendor in the study and addenda prepared after the study was published if that is appropriate.

Forecasts reflect analysis of the market trends in the segment and related segments. Unit and dollar shipments are analyzed through consideration of dollar volume of each market participant in the segment. Installed base analysis and unit analysis is based on interviews and an information search. Market share analysis includes conversations with key customers of products, industry segment leaders, marketing directors, distributors, leading market participants, opinion leaders, and companies seeking to develop measurable market share.

Over 200 in depth interviews are conducted for each report with a broad range of key participants and industry leaders in the market segment. We establish accurate market forecasts based on economic and market conditions as a base. Use input/output ratios, flow charts, and other economic methods to quantify data. Use in-house analysts who meet stringent quality standards.

Interviewing key industry participants, experts and end-users is a central part of the study. Our research includes access to large proprietary databases. Literature search includes analysis of trade publications, government reports, and corporate literature.

Findings and conclusions of this report are based on information gathered from industry sources, including manufacturers, distributors, partners, opinion leaders, and users. Interview data was combined with information gathered through an extensive review of internet and printed sources such as trade publications,

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trade associations, company literature, and online databases. The projections contained in this report are checked from top down and bottom up analysis to be sure there is congruence from that perspective.

The base year for analysis and projection is 2011. With 2011 and several years prior to and after that as a baseline, market projections were developed for 2017 through 2023 available in the market research on this topic. These projections are based on a combination of a consensus among the opinion leader contacts interviewed combined with understanding of the key market drivers and their impact from a historical and analytical perspective.

The analytical methodologies used to generate the market estimates are based on penetration analyses, similar market analyses, and delta calculations to supplement independent and dependent variable analysis. All analyses are displaying selected descriptions of products and services.

This research includes referencde to an ROI model that is part of a series that provides IT systems financial planners access to information that supports analysis of all the numbers that impact management of a product launch or large and complex data center. The methodology used in the models relates to having a sophisticated analytical technique for understanding the impact of workload on processor consumption and cost.

WinterGreen Research has looked at the metrics and independent research to develop assumptions that reflect the actual anticipated usage and cost of systems. Comparative analyses reflect the input of these values into models.

The variables and assumptions provided in the market research study and the ROI models are based on extensive experience in providing research to large enterprise organizations and data centers. The ROI models are useful for comparing products from different manufacturers, for example servers from different manufacturers, Systems z models from IBM, and labor costs by category around the world.

This information has been developed from WinterGreen research proprietary data bases constructed as a result of preparing market research studies that address the software, energy, healthcare, telecommunications, and hardware businesses.

YOU MUST HAVE THIS STUDY

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Table of Contents

Orchestration Software: Executive Summary

The study is designed to give a comprehensive overview of the Orchestration Software: Data Center automation market segment. Research represents a selection from the mountains of data available of the most relevant and cogent market materials, with selections made by the most senior analysts. Commentary on every aspect of the market from independent analysts creates an independent perspective in the evaluation of the market. In this manner the study presents a comprehensive overview of what is going on in this market, assisting managers with designing market strategies likely to succeed.

SEA CHANGE SERIES: ORCHESTRATION SOFTWARE IN THE MEGA DATA CENTER

Sea Change Series: Orchestration Software in the Mega Data Center, Amazon, Google, Microsoft, Facebook	
Aim to Realign IT Cost Structure	3
Internet Has Grown by a Factor of 100 Over The Past 10 Years	4
Table of Contents	5
Orchestration Software Automates Data Center Infrastructure	14
Software Containers	15
Orchestration Schedulers Manage Containers	16
Orchestration Software Supports Container Automation	17
Realigning Data Center Cost Structures	18
IT Relies On Replacing Virtual Machine: VM Virtualization	19
Microservices 20	
Microservices Features	21
Microservices Modules	23
Difficulties with Virtual Machines	24
Hypervisor a Difficulty	25
Virtual Machines Use Bare Metal, Containers Use Orchestration Software	27
Bare Metal an Inefficient Use of Compute Resource	28
Bare Metal Less Efficient	28
Industry Uses Robots Because Manual Labor Is Slow And Error Prone	29
IT processes Replace Manual Labor	30
Mega Data Center Orchestration Software	31
Large Fabric Network Not The Kind Of Environment That Can Be Realistically Configured And Operated In A Manual Way	32
To Automate the Data Center Fabric	33
Value of Data Center Fabric	33
Google Shift from Bare Metal To Container Controllers	34
Google Container Controller Shift From Bare Metal In A Mixed Workload And In Nested Compute Units	35
Google Kubernetes Groups Software Containers	36
Fabric Services Inside A Container	37
Architecting Microsoft Cloud	38
Microsoft Managed Clustering and Container Management: Docker and Mesos	39
Microsoft Azure Service Fabric	41
Microsoft Is Seen As The Overall Winner In The Move To Application Containers	42
Microsoft Dublin Cloud 2.0 Mega Data Center	43
Microsoft Data Center, Dublin, 550,000 Square Feet	43
Microsoft Dublin Center Operates at a Power Usage Effectiveness (PUE) of 1.25.	44
Microsoft Data Center Container Area in Chicago.	44
Microsoft	45
Advantages of Using Containers	46
Orchestration Software Used to Create Containers	47
Disadvantages of Using Containers	48

WinterGreen Research, INC.

Advantages of Virtual Machines	49
Container Orchestration	50
Use of Containers Eliminate Manual Process	51
IT Pros Increasingly Turn to Chef and Puppet	52
Hardware Containers Do Not Scale	53
Facebook Data Center Positioning	54
IBM Data Center Orchestration Software Automates Application Integration	55
Docker Orchestration & Docker Swarm	56
Docker Container Platform	57
Common Feature Sets For Orchestration Tools	58
Not all Orchestrators Are Created Equal	59
AWS Cloud Container Adoption Criteria	60
AWS Cloud Adoption Methodology	63
AWS Cloud Adoption Framework	64
AWS Market Leader In Cloud Computing	65
Facebook Fabric and Node are Core Structures Leveraging Software Orchestration	66
Apache Mesos Orchestration Software	67
Google Kubernetes Container	68
Google Container Builder Step Toward Building Pluggable Components in a Pipeline	69
Google Programmable Access To Network Stack	70
Google Andromeda Software Defined Networking (SDN)-	71
Google Compute Engine Load Balancing	72
Google Compute Engine Load Balanced Requests Architecture	73
Google Scaling Of The Compute Engine Load Balancing	74
Google Compute Engine (GCE) TCP Stream Performance Improvements	75
Google Cloud Platform TCP Andromeda Throughput Advantages	76
Google Open Sourced Its Container Management System Called Kubernetes	77
Facebook 79	
Ability To Move Fast And Support Rapid Growth At The Core Of Facebook Infrastructure Design Philosophy	80
The Right Type of Cloud: Mega Data Centers	82
AWS Has Been Able To Adapt To Change	83
Manual Labor Is Slow And Error Prone	84
Mega Data Center Orchestration Software	86
Amazon, Google, Microsoft, Facebook	87
Cloud 2.0 Mega Data Center Fabric Implementation	87
Fabric and Node are Core Structures Leveraging Software Orchestration	89
Multi-Threading, Dynamic Systems	91
Oracle Multi-Threading Mega Data Center	92
Orchestration Tools Manage A Cluster As A Single Deployment	93
Microservice Monitoring with Google Kubernetes	94
Docker Container	94
Cluster Functions and Pod Benefits	95
Mesosphere DC/OS an Open-Source Project Built on Apache Mesos	96
Mesosphere Enterprise DC/OS Orchestration Software	96
Mesosphere DC/OS Production Containers Uses	97
Mesosphere DC/OS Orchestration Software	97
Mesosphere DC/OS Extending Capabilities Within Container Orchestration	98
Mesosphere DC/OS Certification Compliance	98
Mesosphere Market Leadership Position	99
Mesosphere DC/OS Runs Data Services on One Single Platform	99
Cloud Computing Not Enough: Entire Warehouse Building As A Single Mega Data Center System	100
Red Hat Ansible	101
Red Hat Ansible Architecture, Agents, And Security	102
Red Hat Ansible Advanced Features	102
Red Hat / Ansible	103
Red Hat Ansible Tower 3 Job Run Metrics	104
Cisco Integrated Infrastructure Management	105
Cisco UCS Helps Manage Administrative Costs And Reign In Complexity	106
Mesosphere DC/OS: Mesos Features	108

REPORT # SH27005197

115 PAGES

75 TABLES AND FIGURES

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Heart of DC/OS: Apache Mesos	109
DC/OS Implements Containers	110
WINTERGREEN RESEARCH,	111
WinterGreen Research Methodology	112

List of Figures

Mega Data Center Depends on Orchestration Software to Control Operations, Implement Microservices	
Figure 1. Slow Growth Mode of Companies with Enterprise Data Centers	3
Figure 2. Mega Data Center Fabric Implementation	4
Figure 3. Business Innovation and Technology	14
Figure 4. Docker Orchestration Software Creates Containers	15
Figure 5. Docker Compose	16
Figure 6. Mesosphere Marathon	16
Figure 7. Google Kubernetes	16
Figure 8. Orchestration Software Supports Container Automation	17
Figure 9. Orchestration Software Decreases Data Center Cost Structure	18
Figure 10. Files Bundled into a Container	19
Figure 11. Microservices: Suite Of Independently Deployable Service Modules with a Unique Process And Well-Defined, Lightweight Communication Portal: Mechanism To Serve A Business Goal	20
Figure 12. Microservices Distinct Features: Taxi Hailing Example	21
Figure 13. Microservices Market Segments	22
Figure 14. Microservices Modules	23
Figure 15. Hypervisor Virtualization Operating System Interface	24
Figure 16. Hypervisor Virtualization Operating System Interface	25
Figure 17. Virtual Machines Less Efficient Than Containers	26
Figure 18. Difference Between Virtual Machines and Containers	26
Figure 19. Bare Metal Management Replaced by Container Controllers	27
Figure 20. Containers vs. VMs	28
Figure 21. Industrial Robots Eliminate Manual Labor	29
Figure 22. Industry Uses Robots To Replace Manual Labor	29
Figure 23. Data Centers Need The Precision and Automation Similar to that Provided by Multi-Step Sequential Task Industrial Robots	30
Figure 24. Mega Data Center Orchestration Software	31
Figure 25. Single-Fabric Data Center Network Architecture	32
Figure 26. Bare Metal Presents a Lot of Extra Parameters and Metrics, Significantly More than With Containers	34
Figure 27. Nested Compute Units	35
Figure 28. Kubernetes Orchestration Software Groups Containers That Make Up An Application Into Logical Units	36
Figure 29. Kubernetes Orchestration Software Functions	36
Figure 30. Container Features as it integrates with the Service Fabric Runtime	37
Figure 31. Microsoft Setting Up A Secure Service Fabric Cluster in Azure using the Azure Portal.	40
Figure 32. Microsoft Data Center, Dublin, 550,000 Sf	43
Figure 33. Container Area In The Microsoft Data Center In Chicago	44
Figure 34. Microsoft Cloud Network Features	45
Figure 35. Like Physical Containers on a Ship, Software Containers Bring Many Servers Densely Packed	46
Figure 36. Advantages of Using Containers	47
Figure 37. Software Orchestration Container Challenges	48

REPORT # SH27005197

115 PAGES

75 TABLES AND FIGURES

2017

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Figure 38.	Manual Process	51
Figure 39.	Containers Need Orchestration Software	51
Figure 40.	Virtual Machine Data Center Management Tasks:	52
Figure 41.	FaceBook Open Compute Project	53
Figure 42.	Facebook Data Center Modernization Functions	54
Figure 43.	Facebook Altoona Iowa Cloud 2.0 Mega Data Center	54
Figure 44.	Manual Process for Application Integration Deployment	55
Figure 45.	Feature Sets For Orchestration Tools	58
Figure 46.	Issues for Orchestration Software	59
Figure 47.	AWS Cloud Container Adoption Criteria	60
Figure 48.	AWS Cloud Container	61
Figure 49.	AWS Cloud Adoption Framework	62
Figure 50.	AWS Market Leader In Cloud Computing	65
Figure 51.	Description of the Orchestration Software	67
Figure 52.	Advantages of Using the Container Builder Cloud Architecture as a Service:	69
Figure 53.	Google Andromeda Cloud High-Level Architecture	70
Figure 54.	Google Andromeda Software Defined Networking (SDN)- Based Substrate Functions	71
Figure 55.	Google Andromeda Performance Factors Of The Underlying Network	72
Figure 56.	Google Compute Engine Load Balanced Requests Architecture	73
Figure 57.	Google Compute Engine Load Balancing	74
Figure 58.	Google Cloud Platform TCP Andromeda Throughput Advantages	76
Figure 59.	IoT: Open Source IoT High Level Platform, OpenStack and Kubernetes	78
Figure 60.	Facebook DuPont Fabros Technology Ashburn, VA Data Center	81
Figure 61.	Cloud 2.0 Mega Data Centers Support 1.5 Billion Facebook Users Worldwide.	82
Figure 62.	AWS Market Leader In Cloud Computing	83
Figure 63.	Data Centers Need The Precision and Automation Provided by Multi-Step Sequential Task Industrial Robots	85
Figure 64.	Mega Data Center Orchestration Software Functions	86
Figure 65.	Multiple Pathways Open To Processing Nodes In The Cloud 2.0 Mega Data Center Functions	90
Figure 66.	Dynamic Load Balancing	91
Figure 67.	Mesosphere Customer References	96
Figure 68.	Mesosphere DC/OS Certification Compliance	98
Figure 69.	Cloud Is Not Enough	100
Figure 70.	Red hat Ansible Playbook Language Advanced Features	103
Figure 71.	Red Hat Ansible Tower 3 Job Run Metrics	104
Cisco UCS Helps Manage Administrative Costs And Reign In Complexity		106
Figure 72.	Cisco UCS Helps Manage Administrative Costs And Reign In Complexity	106
Figure 73.	Cisco UCS Director Delivers Comprehensive Infrastructure Management and Orchestration	107
Figure 74.	Mesosphere DC/OS: Mesos Features:	108
Figure 75.	Native Mesos Containerizer Functions	110

ABOUT THE COMPANY

WinterGreen Research, research strategy relates to identifying market trends through reading and interviewing opinion leaders. By using analysis of published materials, interview material, private research, detailed research, social network materials, blogs, and electronic analytics, the market size, shares, and trends are identified. Analysis of the published materials and interviews permits WinterGreen Research senior analysts to learn a lot more about markets. Discovering, tracking, and thinking about market trends is a high priority at WinterGreen Research. As with all research, the value proposition for competitive analysis comes from intellectual input.

WinterGreen Research, founded in 1985, provides strategic market assessments in telecommunications, communications equipment, health care, Software, Internet, Energy Generation, Energy Storage, Renewable energy, and advanced computer technology. Industry reports focus on opportunities that expand existing markets or develop major new markets. The reports access new product and service positioning strategies, new and evolving technologies, and technological impact on products, services, and markets. Innovation that drives markets is explored. Market shares are provided. Leading market participants are profiled, and their marketing strategies, acquisitions, and strategic alliances are discussed. The principals of WinterGreen Research have been involved in analysis and forecasting of international business opportunities in telecommunications and advanced computer technology markets for over 30 years.

The studies provide primary analytical insight about the market participants. By publishing material relevant to the positioning of each company, readers can look at the basis for analysis. By providing descriptions of each major

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participant in the market, the reader is not dependent on analyst assumptions, the information backing the assumptions is provided, permitting readers to examine the basis for the conclusions.

WinterGreen Research is positioned to help customers facing challenges that define the modern enterprises. The increasingly global nature of science, technology and engineering is a reflection of the implementation of the globally integrated enterprise. Customers trust wintergreen research to work alongside them to ensure the success of the participation in a particular market segment.

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ABOUT THE PRINCIPAL AUTHOR

Susan Eustis, President, co-founder of WinterGreen Research is a senior analyst. She has done research in healthcare, communications and computer markets and applications. She has written about computer assisted coding and participated in the research on that topic for the past seven years. She holds several patents in microcomputing and parallel processing. She has the original patents in electronic voting machines. She has new patent applications in format varying, mulit-processing, and electronic voting. She is the author of recent studies of the Internet, Mega Data Centers, Cloud computing, Surgical Robots, drones, Agricultural robots, Industrial robots, Solar Renewable Energy, Wind Energy, Thin Film Batteries, Business Process Management marketing strategies, Internet equipment, biometrics, a study of Internet Equipment, Worldwide Telecommunications Equipment, Top Ten Telecommunications, Digital Loop Carrier, Web Hosting, Web Services, and Application Integration markets. The company wrote the first Internet study. They are experts in oxygen markets. Ms. Eustis is a graduate of Barnard College. Worldwide Who's Who named her Top Female CEO of 2012, 2013, 2014, 2015, 2016.

About the WinterGreen Research Team: The WinterGreen Research Team is comprised of senior analysts that prepare the market research and analysis that is offered to the client and developed using an iterative process to achieve a final study. Typical projects include providing market/viability research. The team can look at how drones can be applied to critical infrastructures safety, including: type of market existing, Barriers, Forecast demand and competitors, SWOT and competitive advantages, Price Analysis, product design recommendations (marketing orientation).

Research is typically for many different regions or localities, for example EU countries including Spain, UK, Nordic, Germany, and France. Typical projects profile the United States and areas of Asia. It is common to three representative

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countries from South America, Brazil, Argentina, Chile, and Mexico. Representative countries from Asia APAC typically include Japan, China, India, and Australia.

Critical infrastructure safety, including: type of market existing, barriers to entry and to faithful execution of product provision, forecast of demand, market share, SWOT, competitive advantage of major competitors, identification of new technologies and new companies, price performance analysis, product design recommendations, and marketing considerations are typical topics covered.

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