

# Amazon CloudWatch



# What is Amazon CloudWatch ?

1. Monitoring service for AWS resources

3. Monitors log files

5. Provides real-time visibility

7. Identifies trends and patterns

9. Integrates with other AWS services

Monitors AWS resources

Monitors applications on AWS

Sets alarms based on log entries

Specific phrases, values, or patterns

Resource utilization

Application performance

Operational health

Analyzes data

Informs resource allocation and optimization

EC2

RDS

S3

2. Collects and tracks metrics

4. Sets alarms and triggers actions

6. Automates resource management

8. Supports analytics with collected data

CPU utilization, data transfer, disk usage

Provides insights into resource performance

Sends notifications

Automatically makes changes to resources

Stops underutilized instances

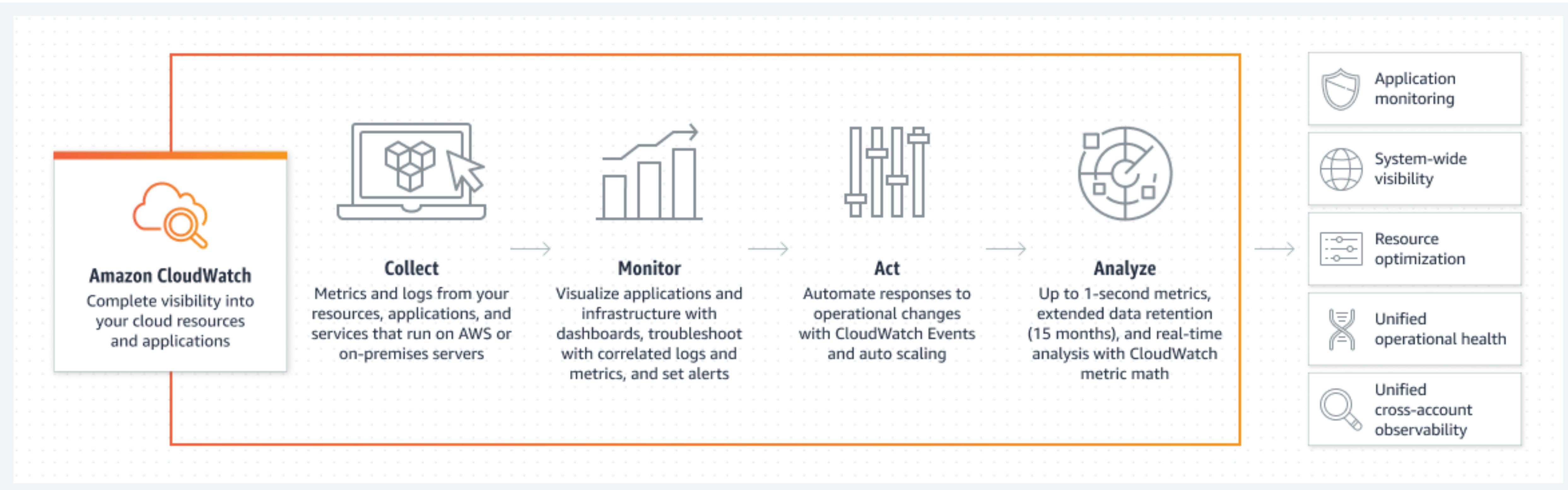
Scales resources based on demand

Optimizes performance

Unified view of operational health

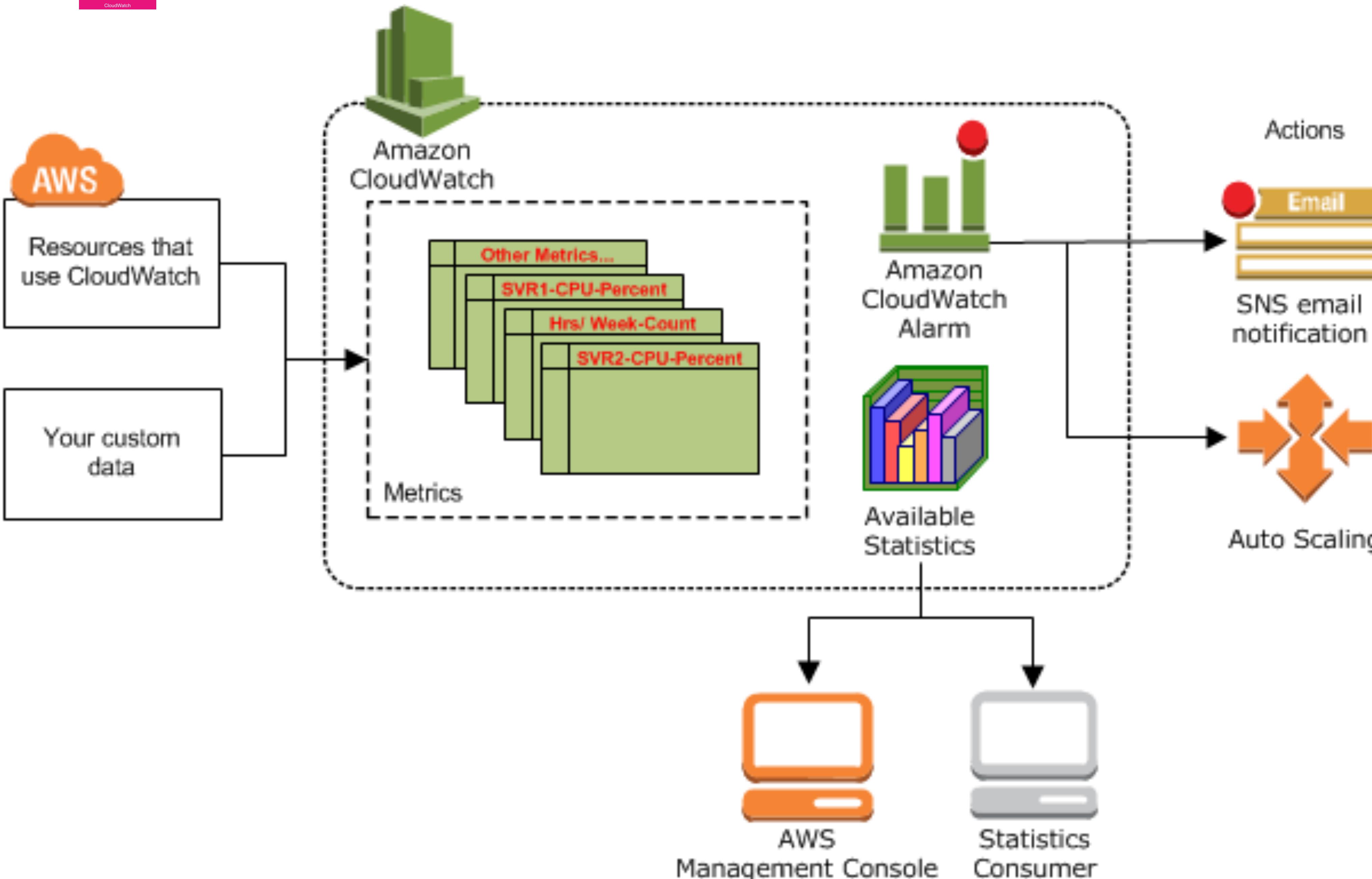


# High Level Overview





# How Amazon CloudWatch Works 😐 ?





# Amazon CloudWatch Concepts

## 1. 📁 Namespaces

📦 Containers for metrics

🏷️ Unique namespace names

## 3. 🔎 Dimensions

ID Name/value pairs

🏷️ Categorize metrics

FilterWhere by characteristics

## 5. 📈 Statistics

🎲 Metric data aggregations

📊 Average, minimum, maximum, sum, count

## 7. ⚡ Alarms

⚡ Watches metrics

⚠️ Triggers actions on thresholds

✉️ Sends notifications

⬆️⬇️ Scales resources

🤖 Executes AWS Lambda functions

## 2. ⚡ Metrics

⚡ Data points over time

⌚ Timestamp

📏 Value and unit of measure

## 4. 🕰 Resolution

⌚ 1-second to 1-day intervals

🔍 Granular data points

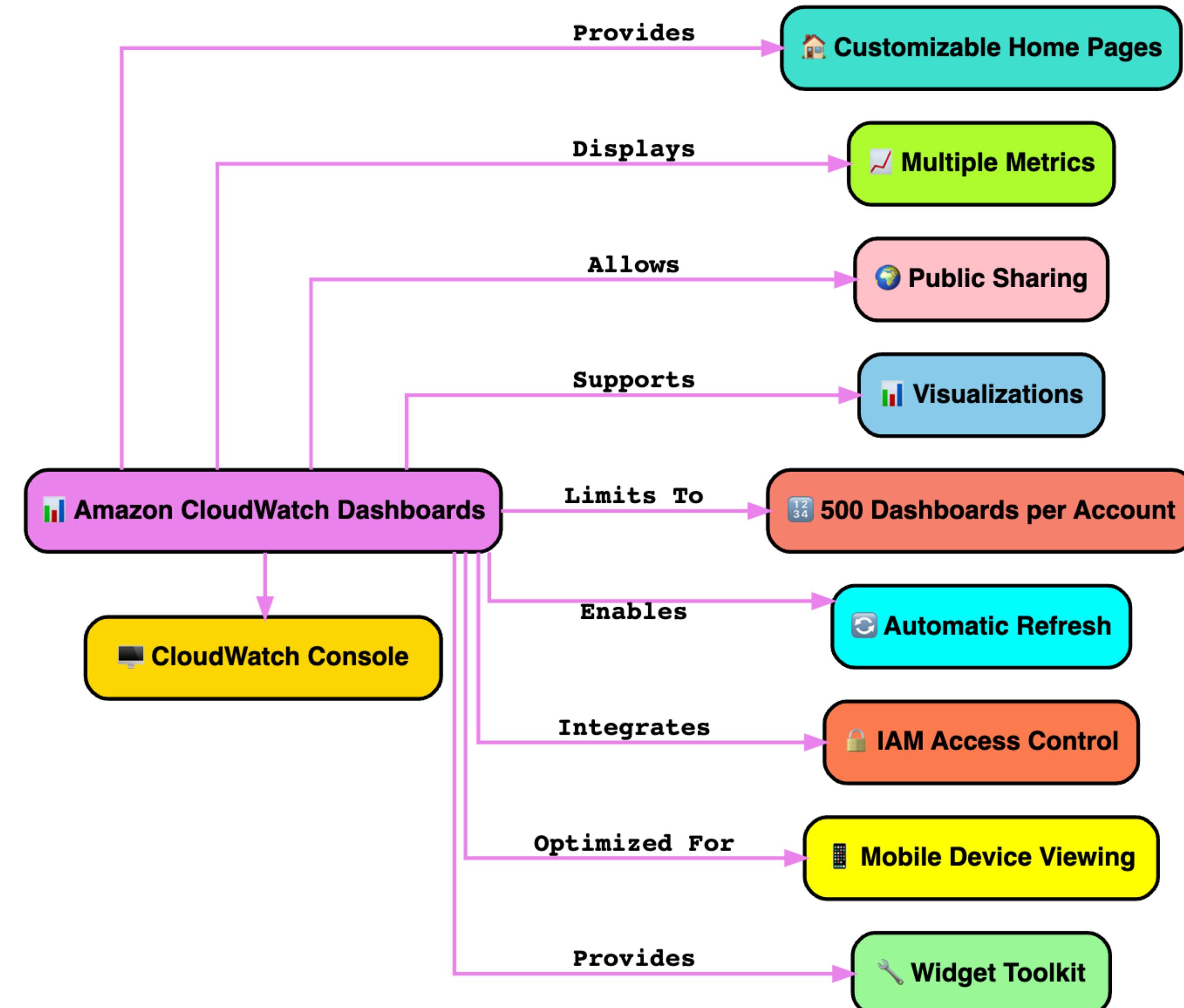
📅 Aggregates over longer periods

## 6. 📊 Percentiles

📋 Relative standing in dataset

📊 p90, p95, p99, p99.9, p99.99

# Amazon CloudWatch Dashboards

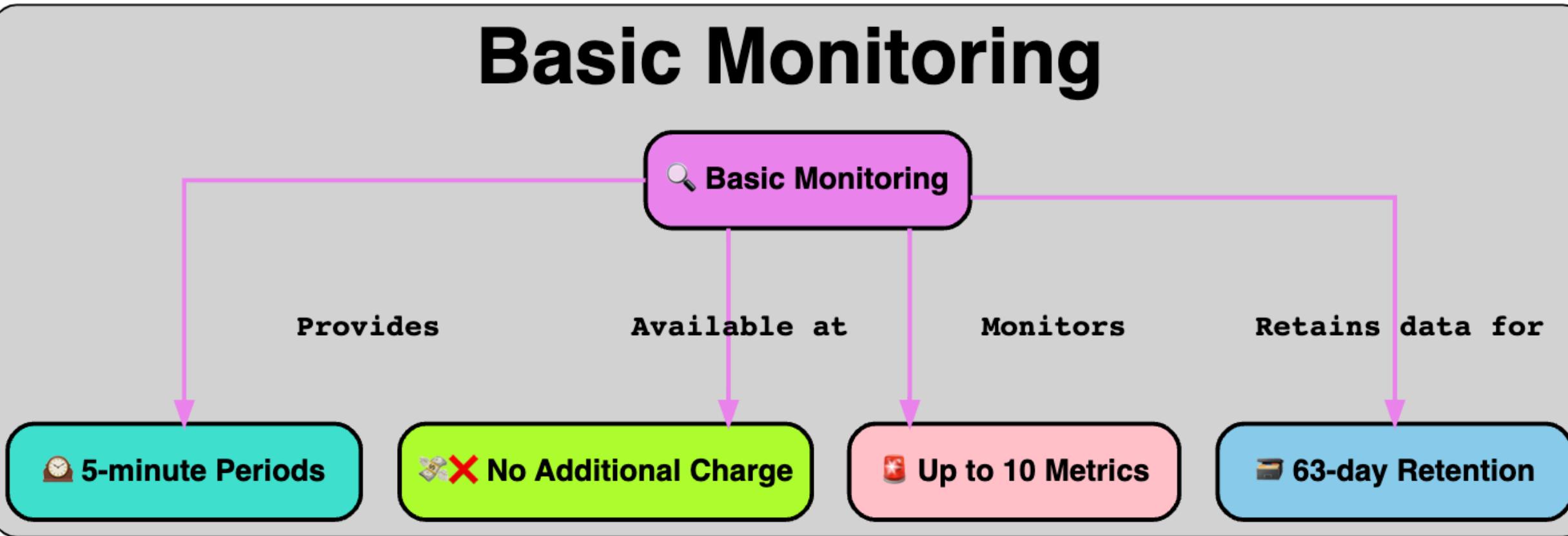


## Amazon CloudWatch Dashboards

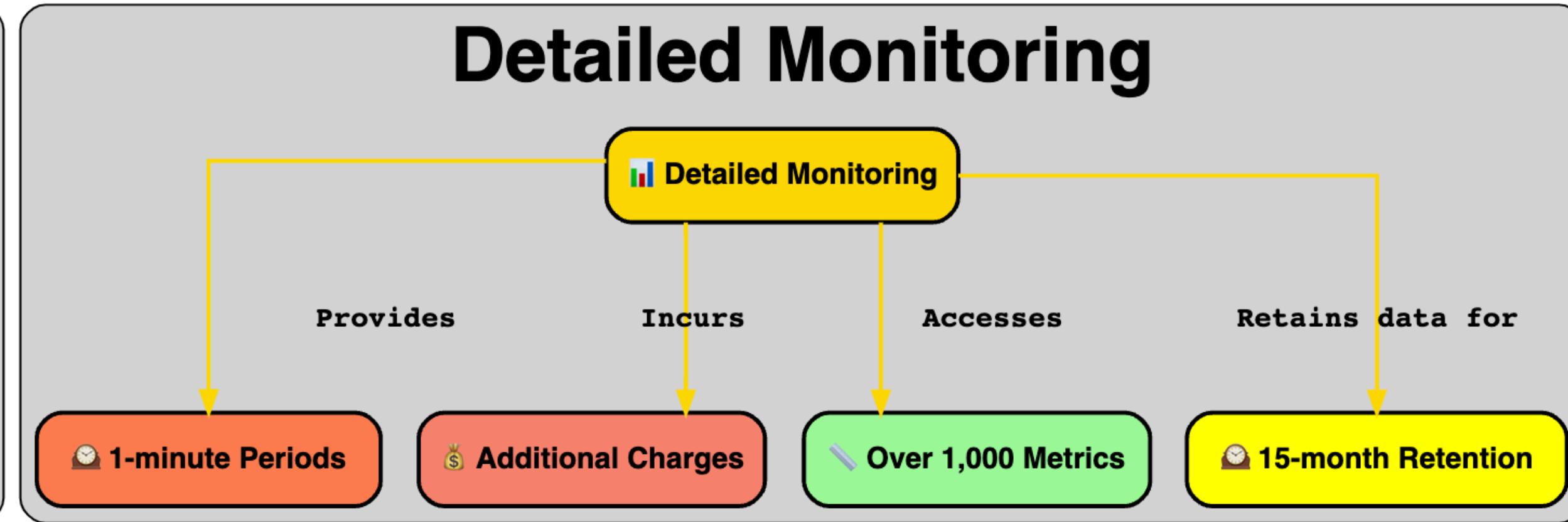
1. **Customizable home pages:** In CloudWatch console, monitor resources in single location
2. **Multiple metrics in single view:** Customized views of metrics and alarms, Across multiple regions, Unified view of services' health and performance
3. **Create up to 500 dashboards per account:** Ample flexibility to organize and monitor, According to your needs
4. **Automatic refresh of monitoring data:** Every 10s to 1 day, With most recent data, Configurable refresh intervals
5. **Control access with IAM policies and sharing:** AWS Identity and Access Management (IAM) policies, Share with other users, Make dashboards public
6. **View dashboards on mobile devices:** Optimized for mobile viewing, Monitor resources on the go
7. **Interactive and dynamic visualizations:** Line charts, stacked area charts, number widgets, Dive deeper into metrics, Gain valuable insights
8. **Easy-to-use widget toolkit:** Graphs, metrics, alarms, Customize dashboard views, According to monitoring needs

# Basic Monitoring and Detailed Monitoring

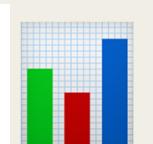
## Basic Monitoring



## Detailed Monitoring



## Basic Monitoring and Detailed Monitoring

1.  **Basic monitoring:**  5-minute periods,  No additional charge,  Up to 10 metrics,  63-day retention
2.  **Detailed monitoring:**  1-minute periods,   Granular insights
  -  **Incurs additional charges:**  Cost varies,  \$ Depends on metrics and resources
  - **Over 1,000 metrics:**  In-depth analysis and troubleshooting
  - **15-month retention:**  For 1-minute data,  Allows long-term analysis and trend identification

# Query Your Metrics with CloudWatch Metrics Insights .

1.  Built-in query language for metrics

 Query and analyze metrics data with ease

2.  Powerful aggregation and filtering capabilities

 Extract meaningful insights

 Focus on specific aspects of system performance

3.  Visualize query results in graphs

 Intuitive graphs

 Understand trends, patterns, and anomalies

4.  Analyze metrics over specified time periods

 Analyze data over specific time periods

 Identify performance issues and gain historical insights

5.  Save, add, and share queries as favorites

 Save frequently used queries

 Add new queries and share favorites with team members

6.  Schedule queries for periodic reports

 Schedule queries to run periodically

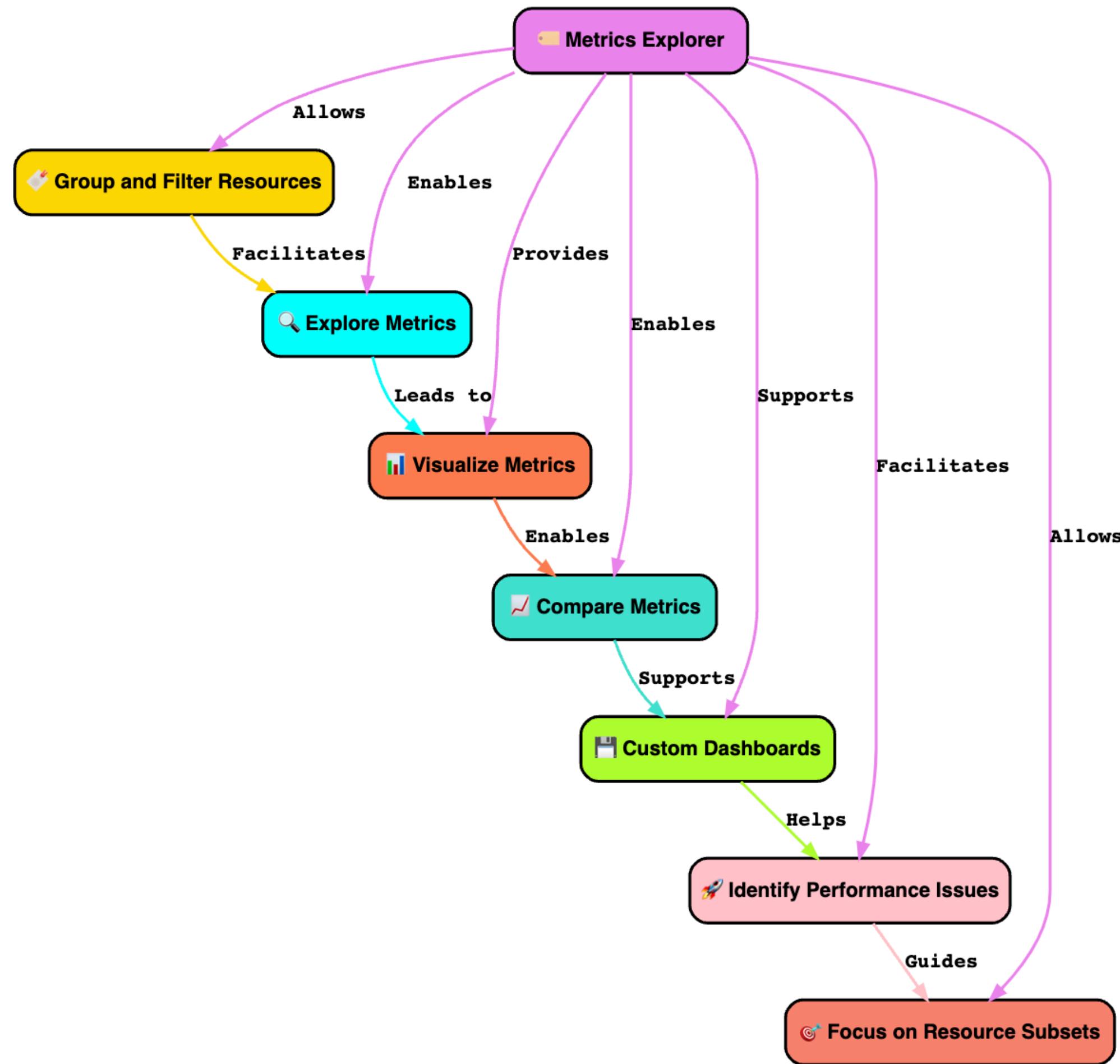
 Generate automated reports and stay informed

7.  Faster troubleshooting and root cause analysis

 Accelerate troubleshooting processes

 Identify root causes efficiently and improve system stability

# Use Metrics Explorer to Monitor Resources by Tags and Properties



1. **Group and filter resources using tags:** Tags and resource properties, Monitor specific infrastructure subsets
2. **Explore metrics across resources:** Compare metrics across multiple resources, Identify trends, patterns, and anomalies
3. **Visualize metrics in interactive graphs:** Real-time visualization and analysis, Zoom, pan, hover for detailed information
4. **Compare metrics from different resources:** Side-by-side comparison, Identify correlations, dependencies, bottlenecks
5. **Save and share custom dashboards:** Focus on specific resources and metrics, Collaborative monitoring and troubleshooting
6. **Quickly identify performance issues:** Identify anomalies in the system, Faster problem detection and resolution
7. **Focus on specific resource subsets:** Based on tags and properties, Monitor and optimize critical components



CloudWatch

# Use Metric Streams to Analyze CloudWatch Metrics .

1.  Stream metrics to external destinations

 Continuous streaming for analysis and storage

2.  Choose specific metrics to stream

 Focus on relevant data for analysis

3.  Stream to Amazon Kinesis Data Firehose

 Deliver metrics to various destinations

 Amazon S3, Amazon Redshift, third-party services

4.  Analyze metrics using external tools

 Leverage analytics tools and machine learning

 Gain deeper insights from metric data

5.  Pay only for metrics streamed

 Cost-effective analysis

 Avoid unnecessary expenses

6.  Control access with IAM policies

 Secure streaming to external destinations

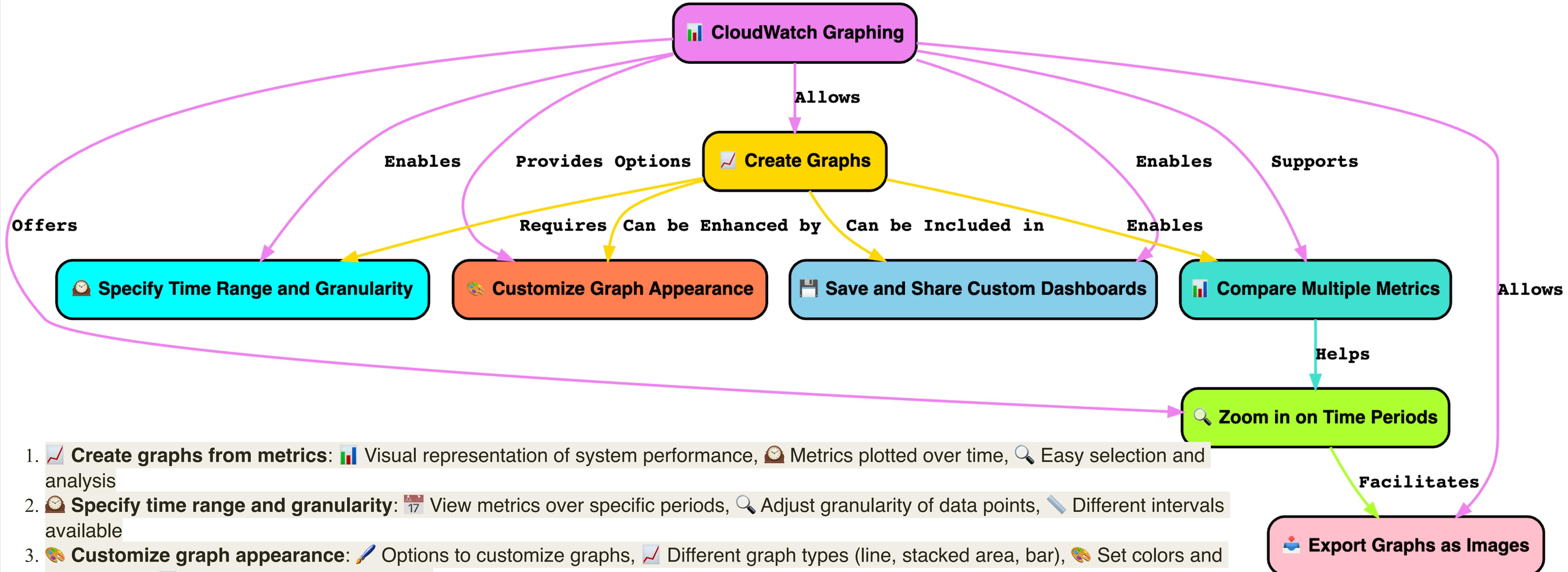
7.  Near real-time metric delivery

 Analyze and react promptly

 Monitor application and infrastructure changes



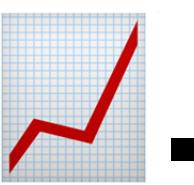
# Graphing Metrics with Amazon CloudWatch



1. **Create graphs from metrics:** Visual representation of system performance, Metrics plotted over time, Easy selection and analysis
2. **Specify time range and granularity:** View metrics over specific periods, Adjust granularity of data points, Different intervals available
3. **Customize graph appearance:** Options to customize graphs, Different graph types (line, stacked area, bar), Set colors and annotations, Adjust axis labels and scales
4. **Compare multiple metrics on a single graph:** Plot multiple metrics together, Compare and correlate system performance aspects, Identify potential bottlenecks
5. **Zoom in on specific time periods:** Focus on periods of interest, Investigate issues or anomalies in detail, View metrics at higher resolution
6. **Export graphs as images:** Export as PNG or JPG, Include in reports, presentations, documentation, Share graphs or use for further analysis
7. **Save and share custom dashboards:** Create dashboards with multiple graphs and metrics, Save dashboards for future reference, Share with users or teams, Enable collaboration in monitoring and troubleshooting



# Using CloudWatch Anomaly Detection



1. Automatically detect anomalies in metrics

Machine learning algorithms

Identify unexpected behavior and issues

3. Identify unexpected changes in metrics

Sudden spikes

Drops

Spot unusual behavior

5. Receive anomaly detection alerts

Amazon SNS notifications

Email

Take prompt action and investigate

Assign likelihood of significance

Prioritize and focus on relevant anomalies

Save time in monitoring and troubleshooting

2. Leverage machine learning algorithms

4. Configure anomaly detection settings

6. Analyze historical data for anomalies

Analyze metrics data

Continuously learn and adapt

Specify sensitivity

Set frequency

Fine-tune and reduce false positives

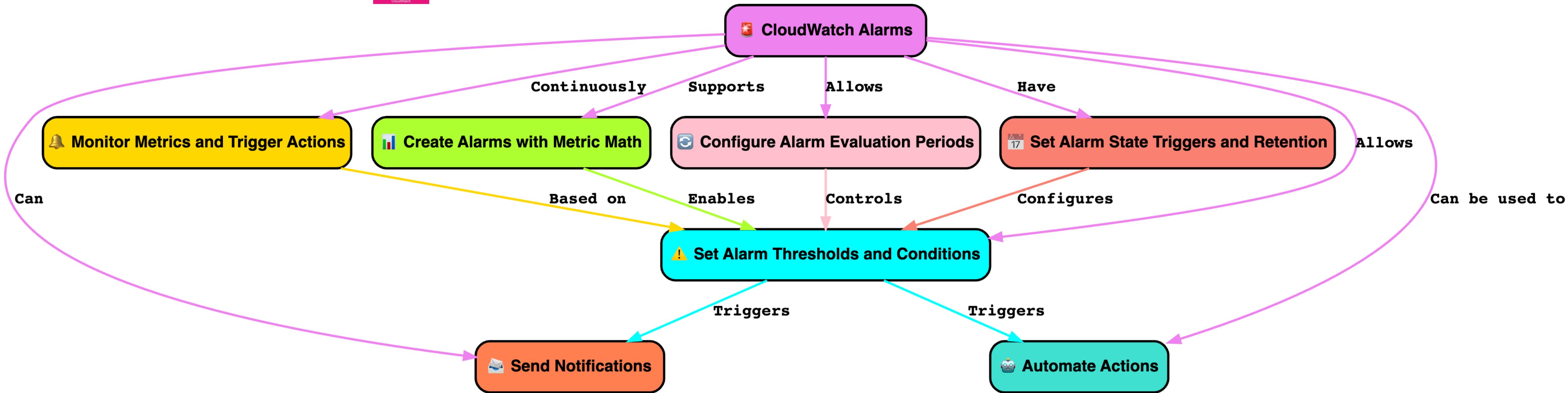
Identify past anomalies

Conduct root cause analysis

Improve system resilience



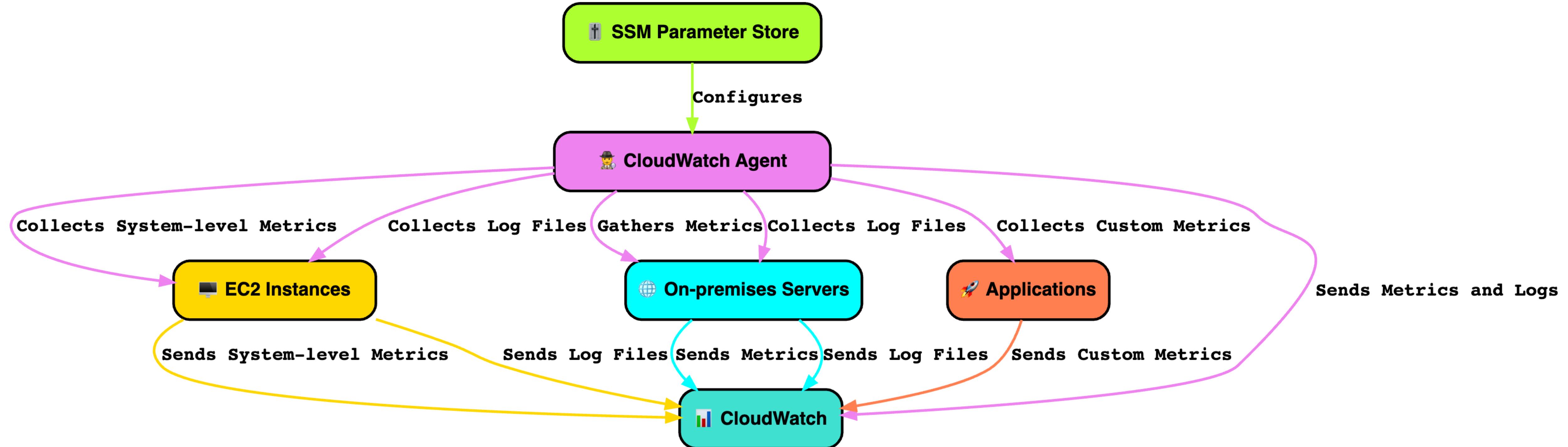
# Using Amazon CloudWatch Alarms



1. **Monitor metrics and trigger actions:** Continuously monitor metrics, Detect and respond to critical changes
2. **Set alarm thresholds and conditions:** Define based on specific requirements, Trigger when metric exceeds or falls below value, Specify evaluation periods
3. **Send notifications:** SNS, email, SMS, Receive timely alerts
4. **Automate actions:** EC2 Auto Scaling policies, AWS Lambda functions
5. **Create alarms based on metric math:** Mathematical calculations of multiple metrics, Define complex alarm conditions
6. **Configure alarm evaluation periods:** Specify number and length of periods, Control sensitivity and avoid false positives/negatives
7. **Set alarm state triggers and retention:** OK, ALARM, INSUFFICIENT\_DATA states, Configure datapoints breaching threshold, Set retention period for future analysis and troubleshooting



# Collect Metrics, Logs, and Traces with the CloudWatch Agent



1. **Collect system-level metrics from EC2 instances:** CPU utilization, memory usage, disk space, Visibility into performance and health
2. **Gather metrics from on-premises servers:** In addition to EC2 instances, Monitor entire infrastructure
3. **Collect log files from EC2 instances and on-premises servers:** Various log formats supported, Send to CloudWatch Logs for analysis
4. **Collect custom metrics from applications:** Application-specific metrics, Insights into performance and behavior
5. **Automatically send metrics and logs to CloudWatch:** Eliminates manual intervention, Continuous streaming for real-time monitoring
6. **Configure using SSM Parameter Store:** Store and manage agent configuration securely, Simple deployment and updates across instances
7. **Enable high-resolution metrics collection:** Collect metrics at higher frequency, Granular data for detailed analysis and troubleshooting

# Logging Amazon CloudWatch API Calls with AWS CloudTrail

1. Enable logging of CloudWatch API calls

Includes API calls from various sources

Console, SDKs, CLI, other services

3. Analyze and monitor log files

Use various tools and services

Athena, QuickSight, third-party tools

5. Investigate and troubleshoot issues

Detailed information about each API call

Investigate performance problems, unexpected changes

7. Integrate with other AWS services

CloudWatch Events, AWS Lambda

Trigger automated actions based on API calls or patterns

2. Store logs in Amazon S3 bucket

Specify destination bucket

Store logs for auditing, compliance, troubleshooting

4. Detect unusual API activities

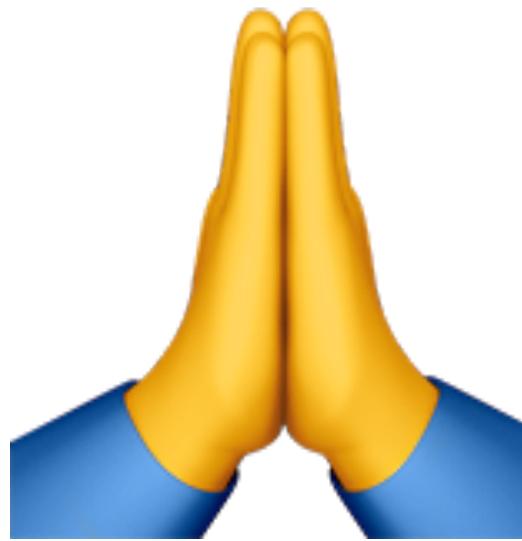
Identify suspicious activities

Unauthorized access, misconfigurations, security breaches

6. Ensure compliance and security

Meet compliance requirements, maintain security

Track changes, ensure accountability, facilitate audits



**Thanks  
for  
Watching**