# verizon1eda

September 27, 2024

[ ]:

```

```

## 1 Part I Exploratory Data Analysis

[Our goal is to build a model to help with categorizing product categories for verizon team] The purpose of the exploratory data analysis is to better understand the contents and structure of the Enterprise Software Products dataset. We will be analyzing the product descriptions to evaluate the quality of the data and to gain insights into the distribution of product details. This will set the foundation for building an NLP model to categorize software products based on their descriptions. We will be reviewing the data quality,and identifying possible trends among product categories to see what features we can emphasize on in future model training

We can first by insepcting the data

[1]:

```
import pandas as pd

products_df = pd.read_csv('C:\\Users\\nchen\\Downloads\\products.csv')
categories_df = pd.read_csv('C:\\Users\\nchen\\Downloads\\categories.csv')
sub_categories_df = pd.read_csv('C:\\Users\\nchen\\Downloads\\sub-categories.
 ↪csv')

print(products_df.head())
print(categories_df.head())
print(sub_categories_df.head())
```

```
                product_name                  vendor_name  \
0         Cloud Secure Agent              INFORMATICA LLC
1  MicroStrategy BI Platform  MICROSTRATEGY SERVICES CORP
2         Signature Services                 QLIKTECH INC
3                     VizLib                 QLIKTECH INC
4      PowerCenter Connector                       ORACLE

     taxonomy_category                      taxonomy_sub_category  \
0  BI & Data Analytics                           Data Governance
1  BI & Data Analytics  Self-Serve Visualization & Ent. Reporting
2  BI & Data Analytics  Self-Serve Visualization & Ent. Reporting
3  BI & Data Analytics  Self-Serve Visualization & Ent. Reporting
4  BI & Data Analytics                   Data Movement Management
```

```
                                product_description
0  The Informatica Cloud Secure Agent is a lightw…
1  The MicroStrategy platform supports interactiv…
2  The Signature Services is a package of key ser…
3  Vizlib is a fully supported third-party visual…
4  Informatica PowerCenter and PowerConnect Adapt…
                            name  \
0                        AI & ML
1             BI & Data Analytics
2  Customer Operational Platforms
3  Design, Development & Delivery
4               Digital Workplace

                                          definition
0  AI is the broad science of a computer mimickin…
1  Capabilities and Technologies to process, stre…
2  Technologies & Capabilities that enable & supp…
3  Technologies & Capabilities that enable softwa…
4  Tools and technology that help as a platform t…
                parent                                       name  \
0              AI & ML                                Development
1              AI & ML                                    Serving
2  BI & Data Analytics                         Analytics Database
3  BI & Data Analytics  Self-Serve Visualization & Ent. Reporting
4  BI & Data Analytics                             Semantic Layer

                                          definition
0  Products/Features that are helpful in developi…
1  Products/Features that are helpful in monitori…
2  Products that support data store for online an…
3  Products that help provide 'Self-Serve Visuali…
4  A semantic layer is a business representation …
```

We also have to check to confirm if there are any missing values in the data, data types and if there are any repeats in the data

[2]:
```python
print("Missing values in Products dataset:")
print(products_df.isnull().sum())

print("Missing values in Categories dataset:")
print(categories_df.isnull().sum())

print("Missing values in Sub-Categories dataset:")
print(sub_categories_df.isnull().sum())

# duplicates
print("Duplicate rows in Products dataset:", products_df.duplicated().sum())
```

```python
print("Duplicate rows in Categories dataset:", categories_df.duplicated().sum())
print("Duplicate rows in Sub-Categories dataset:", sub_categories_df.
 ↪duplicated().sum())

# data types
print("Data types in Products dataset:")
print(products_df.dtypes)

print("Data types in Categories dataset:")
print(categories_df.dtypes)

print("Data types in Sub-Categories dataset:")
print(sub_categories_df.dtypes)
```

```
Missing values in Products dataset:
product_name             0
vendor_name              0
taxonomy_category        0
taxonomy_sub_category    0
product_description      0
dtype: int64
Missing values in Categories dataset:
name          0
definition    0
dtype: int64
Missing values in Sub-Categories dataset:
parent        0
name          0
definition    0
dtype: int64
Duplicate rows in Products dataset: 0
Duplicate rows in Categories dataset: 0
Duplicate rows in Sub-Categories dataset: 0
Data types in Products dataset:
product_name             object
vendor_name              object
taxonomy_category        object
taxonomy_sub_category    object
product_description      object
dtype: object
Data types in Categories dataset:
name          object
definition    object
dtype: object
Data types in Sub-Categories dataset:
parent        object
name          object
```

```
definition    object
dtype: object
```

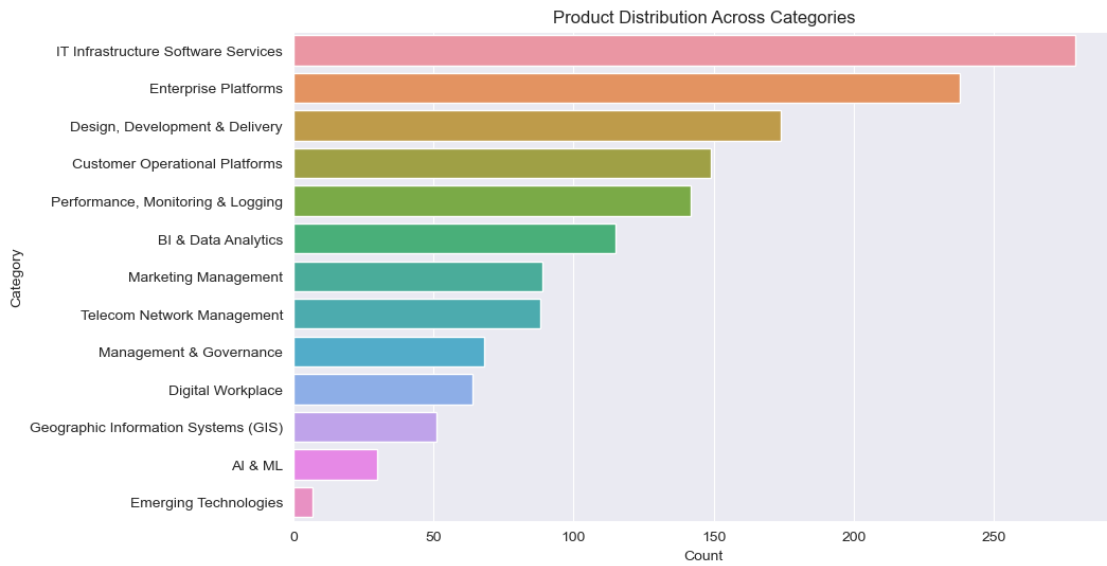
Since we are working with NLP, we will have to understand the distribution of the text data, we can use word count analysis to see if there are short descriptions

[15]:
```
products_df['word_count'] = products_df['product_description'].apply(lambda x:␣
↪len(str(x).split()))
products_df['char_count'] = products_df['product_description'].apply(lambda x:␣
↪len(str(x)))
products_df['sentence_count'] = products_df['product_description'].apply(lambda␣
↪x: len(str(x).split('.')))

# display the statistics
print("Basic Text Statistics for Products")
print(products_df[['product_name', 'word_count', 'char_count',␣
↪'sentence_count']].head())
```

```
Basic Text Statistics for Products
                product_name  word_count  char_count  sentence_count
0         Cloud Secure Agent          28         202               2
1  MicroStrategy BI Platform          52         433               3
2         Signature Services          39         260               2
3                     VizLib          42         286               3
4      PowerCenter Connector          21         174               2
```

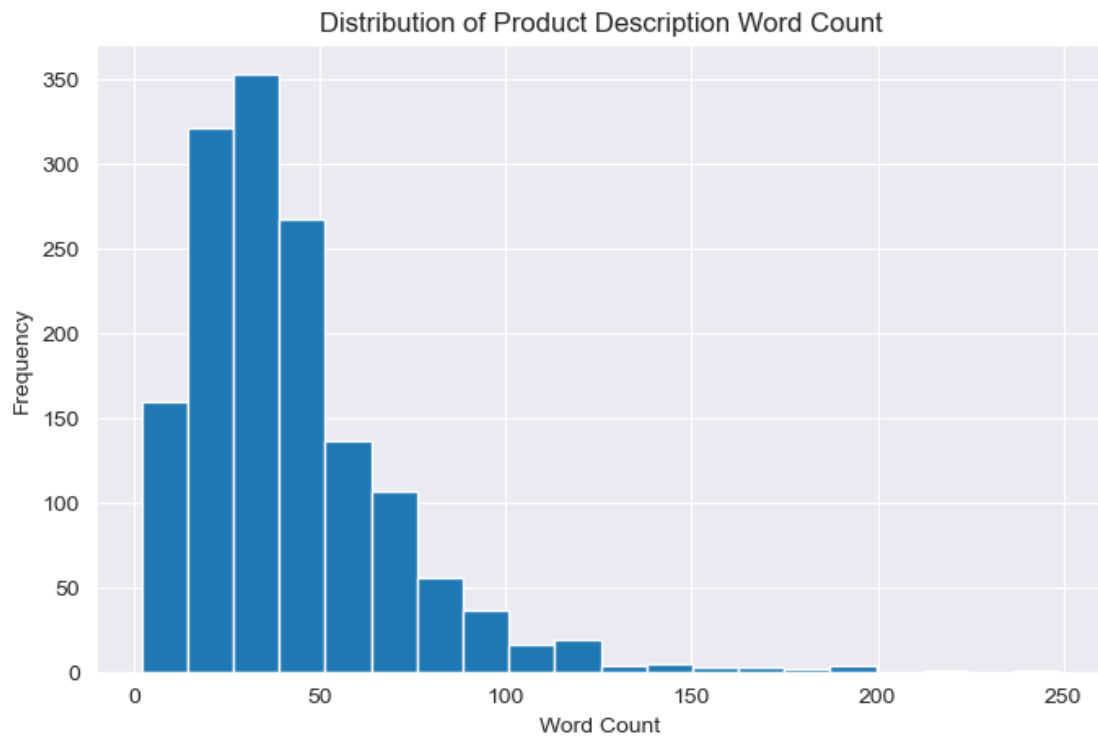
We can also look at the distribution of products across categories to see if there are categories that needs more data for its products.

[16]:
```
import matplotlib.pyplot as plt
import seaborn as sns

plt.figure(figsize=(10, 6))
sns.countplot(y='taxonomy_category', data=products_df,␣
↪order=products_df['taxonomy_category'].value_counts().index)
plt.title("Product Distribution Across Categories")
plt.xlabel("Count")
plt.ylabel("Category")
plt.show()
```




We can see that there is less products for ai & ml and emerging technologies, we can consider looking more into these products later on

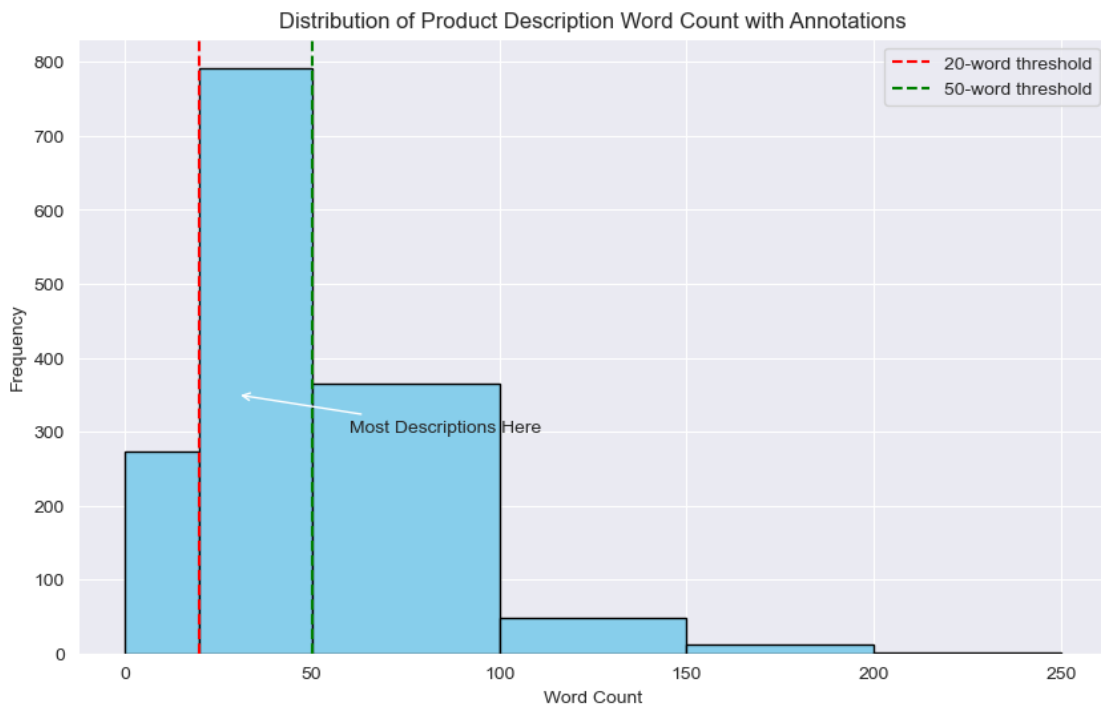
[5]:
```
# we can add a column for word count in the product descriptions
products_df['description_word_count'] = products_df['product_description'].
 ↪apply(lambda x: len(str(x).split()))

# plot histogram
import matplotlib.pyplot as plt

plt.figure(figsize=(8, 5))
products_df['description_word_count'].plot(kind='hist', bins=20)
plt.title('Distribution of Product Description Word Count')
plt.xlabel('Word Count')
plt.ylabel('Frequency')
plt.show()
```




The majority of the product descriptions contain fewer than 50 words. This is indicated by the high frequency (y - axis) on the side (highest between 25-50). The high frequency of words that are lower than 20 words might indicate that we could need more detail for those words. While the graph that shows those with word counts aove 100 might need review to avoid outliers/skew. Below are two testing methods to take a more detailed look at the data.

[46]:
```
import matplotlib.pyplot as plt

products_df['description_word_count'] = products_df['product_description'].
 ↪apply(lambda x: len(str(x).split()))

bins = [0, 20, 50, 100, 150, 200, 250]
labels = ['0-20', '21-50', '51-100', '101-150', '151-200', '201-250']

products_df['word_count_category'] = pd.
 ↪cut(products_df['description_word_count'], bins=bins, labels=labels)

plt.figure(figsize=(10, 6))
plt.hist(products_df['description_word_count'], bins=bins, edgecolor='black',␣
 ↪color='skyblue')

plt.axvline(x=20, color='r', linestyle='--', label='20-word threshold')
plt.axvline(x=50, color='g', linestyle='--', label='50-word threshold')
```

```
plt.annotate('Most Descriptions Here', xy=(30, 350), xytext=(60, 300),
             arrowprops=dict(facecolor='black', arrowstyle='->'))

# Adding titles and labels
plt.title('Distribution of Product Description Word Count with Annotations')
plt.xlabel('Word Count')
plt.ylabel('Frequency')
plt.legend()

# Display the plot
plt.show()
```




[47]:
```
# thresholds
low_word_count_threshold = 20
high_word_count_threshold = 100

# filter product names for descriptions with low word counts (below 20 words)
low_word_count_products = products_df[products_df['description_word_count'] <␣
↪low_word_count_threshold]['product_name']

# Filter product names for descriptions with high word counts (above 100 words)
high_word_count_products = products_df[products_df['description_word_count'] >␣
↪high_word_count_threshold]['product_name']
```

```python
# display the product names with low word counts
print("Products with Low Word Count (Below 20 words):")
print(low_word_count_products.to_list())  # Print as a list

# display the product names with high word counts
print("\nProducts with High Word Count (Above 100 words):")
print(high_word_count_products.to_list())
```

```
Products with Low Word Count (Below 20 words):
['FiveTran Essential Platform', 'ThoughtSpot', 'Hyperion BI Analysis Fee',
'Mobile Analytics', 'SISENSE Platform', 'Easy View', 'EMS Workplace', 'Meetings
& Incentives Worldwide Managed Services', 'Google Chromebox', 'Jamboard', 'Slido
Enterprise', 'Doubledutch (Event CMS)', 'WebEx', 'Connections', 'Moxtra',
'SnagIt', 'Pexip Infinity', 'Bright Talk Webinars', 'Office Professional Plus',
'T1Research', 'Premier Support', 'Skyword360', 'Integration Manager', 'Act On',
'Sendgrid Email', 'Market Analytics and Visualization', 'C2CRM', 'Spectrum
Enterprise Geocoding Module', 'GeoIP2', '3-GIS Web', 'Insight Forensic',
'Document and Mail Automation', 'Bill Print - Mailing', 'Payment Suspense
Manager', 'Suspense Manager', 'Taxation Manager for Vertex', '8MS Managed
Services', 'LiveEngage Managed Services', 'Netcracker', 'VeriFone', 'PSTN
Numbering Ranges', 'Speechmatics', 'Argent Basic', 'Interactive Voice Response
Analytics (IVRA)', 'Satmetrix NPX', 'tagVUE MX', 'tagVUE MX', 'Robotics Process
Automation (RPA)', 'Crucible', 'Fisheye', 'Gruntworks', 'SonarCloud',
'JetBrains', 'Enterprise Integrator', 'API Gateway', 'Athena', 'Elastic
Transcoder', 'Resource Group Tagging', 'SWF', 'X-Ray', 'SmallTalk', 'Garden
Plan', 'IBM XL', 'ILOG CPLEX', 'Informix 4GL', 'Informix SQL', 'Rational App
Dev', 'Reactive Platform', 'iBwave Design', 'Node.js', 'ASN.1 Tools for C', 'MKS
Implementer', 'TOSCA', 'UNIX Packages', 'Pivotal', 'Helm', 'Java', 'Java
Android', 'Java Script', 'Node.js', 'React Boilerplate', 'ReactJS',
'ReactNative', 'Redux', 'Spring Boot & Spring Reactor', 'Styled Components',
'Swift', 'Rally', 'Cloudframe Unlimited', 'User Device Tracker', 'Auto Scaling',
'Batch', 'CloudFormation', 'CloudSearch', 'Data Pipeline', 'Elastic File System
(EFS)', 'Elastic Load Balancing', 'Elastic Load Balancing v2', 'OpsWorks',
'Route 53', 'SageMaker', 'CA-ASO', 'Cloud Optimizer', 'Server Automation (SA)',
'Service Virtualization', 'NetExpert', 'PIWIK Pro', 'SuperVision', 'uberAgent',
'BRIX', 'SNAP', 'Modelling for 5G', 'VFO ASR', 'Hitachi Vantara Managed
Services', 'IBM Cloud', 'SQL Server', 'Microsoft Windows 10 (OLD)', 'Gluster
Storage', 'Cumulus Linux', 'DNS / DHCP', 'Insight Direct Managed Services', 'Red
Hat Guest OS', 'Neo4j', 'Portworx', 'DMS', 'Elastic Container Registry (ECR)',
'Elastic Container Service (ECS)', 'Elastic Kubernetes Service (EKS)', 'RDS',
's3 Glacier', 'Simple Queue Service (SQS)', 'Storage Gateway', 'MF Utilities',
'WinZip', 'Crunchy Certified ProgreSQL', 'InSync Cloud', 'NameSearch', 'Gluent
Data Platform', 'Contact Center Artificial Intelligence (CCAI)', 'Contact Center
Artificial Intelligence (CCAI)', 'Hardware Support', 'Aspera', 'CICS',
'Connect:Direct', 'Linux Workstation', 'MfaaS', 'MQ', 'Resilient Storage',
'InfiniGuard', 'Connect-It', 'Unified Support-Old', 'Windows (OLD)', 'ONX
```

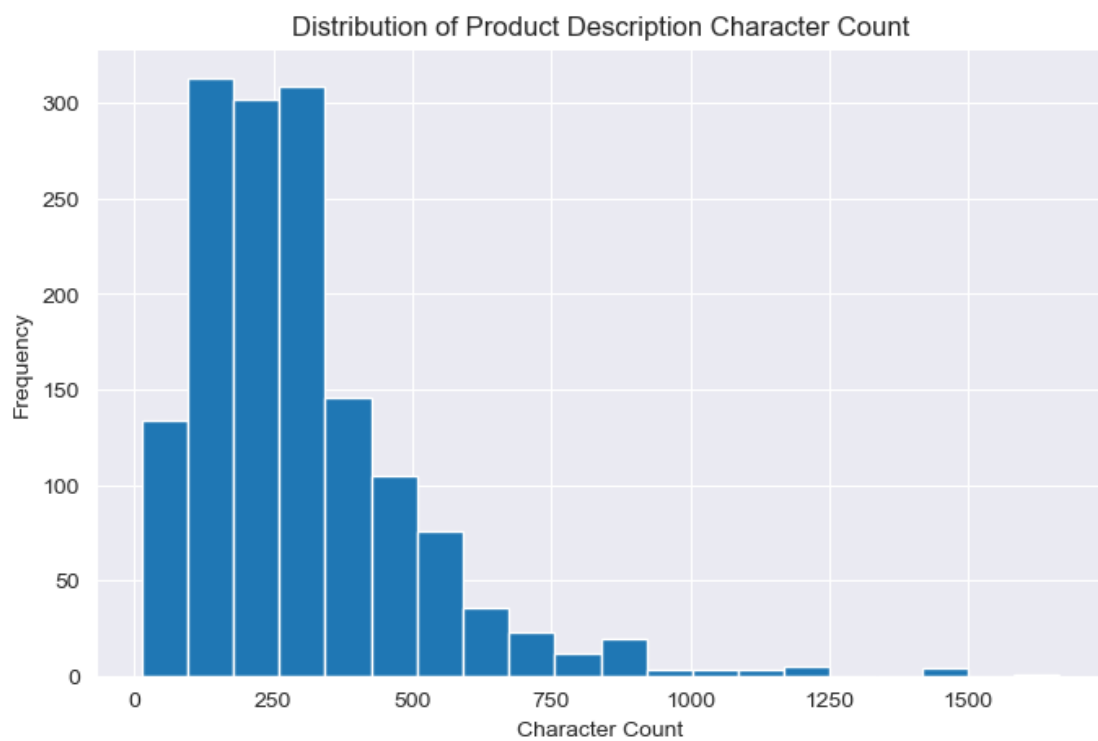
Managed Services', 'MySQL', 'Oracle Database', 'Solaris', 'TimesTen', 'PKZIP Server', 'SharePlex for Oracle', 'Spotlight on SQL Server', 'Toad', 'Elastic Current', 'Redis', 'AirOn', 'Quant Research Platform', 'InSync EndPoint', 'Centralized Asset Transactional Services (CATS)', 'Data Center Infrastructure Management (DCIM)', 'Inventory Management T&M Support', 'Pegasystems Training', 'O Series Indirect Tax', 'Vertex Managed Services', 'Prophet', 'Learning Platform', 'Language Translation', 'MavBridge Core', 'CCH Sales Tax', 'Exemption Certificate Software', 'Conga Grid', 'OrgChart Now', 'Bizagi Automation', 'IDT Telecom Managed Services', 'GPTW Platform', 'Configure Price Quote (CPQ)', 'Leasenet', 'Costpoint', 'Factset Digital', 'GXS Suite', 'Decision Center', 'Enterprise Records', 'EngageOne Designer', 'GeoTAX', 'DocuWare', 'AFP2PDF Plus', 'SPSLE', 'SEC Reporting Tool', 'EPM Maestro', 'Camunda Platform', 'Activ Absence', 'TAP Workflow Automation', '360 Cloud', 'ABS Suite Plus', 'MaxSecure', 'T-RECS', 'IT Service Managment Professional', 'Facility & Project Center', 'Iron Mountain Managed Services', 'iManage', 'Canadian CODE-1 Plus', 'Wirelytics Managed Services', 'Electronic Recyclers Managed Services', '4Tel', 'HAProxy', 'Headspin Platform', 'Virtualized Telecommunication Management Information Platform (vTeMIP)', 'MQ Gem MO71', 'Infragistics Professional', 'LogicMonitor', 'Streme Manager', 'Serv U Managed File Transfer', 'Kiwi SysLog Server', 'Stars Model Management', 'Network Alarm Display System (IMPACT)', 'Acrobat Standard', 'Robohelp', 'Enterprise', 'Additional Non-Production Instance', 'ServiceNow Managed Services', 'Vertex eHub', 'Planning Work Status (PWS)', 'Transport Element Activation Manager', 'Service Order Administration and Control (SOAC)', 'Element Communicator (ELCOM)', 'Customer Network Management System (CNM)', 'Work Manager Consolidation', 'Addressing', 'Enterprise Tax Module', 'Advanced Function Presentation Data Stream (AFPDS)', 'Sensor Intelligence', 'Alternative Linkage', 'Network Support', 'Lucidspark', 'Nuance Speech Recognition', 'Office 365', 'Conversational IVR', 'Data Movement Support / Services', 'Data Movement Support / Services', 'Data Movement Support / Services', 'Data Privacy Management', 'Data Privacy Management', 'Data Privacy Management', 'Data Privacy Management', 'Cloud Data Synchronization Service', 'Additional TB for Archive', 'Google Premium Support + TAM', 'Intro.js', 'HOSTED SOLUTION FOR SMS TEXTING', 'ICP4B', 'ICP4I', 'Data Governance Support / Services', 'Kubecost', 'HCL Technologies Managed Services - Imaging', 'Affordable Connectivity Program (ACP) Platform', 'Arria NLG', 'GoJS', 'Cellwize', 'DevRefactory (re-platform)', 'ASG Multi Family Products 122000508', 'ASG-TeVISTA', 'Verint Email Support', 'Secure Remote Access', 'Verint Managed Services', 'ASG - Multiple Product Family Maintenance', 'Multiple Product Family - Maintenance']

Products with High Word Count (Above 100 words):
['Web Portal', 'Data Quality', 'Heavy.AI Enterprise', 'Data Science Platform', 'Designer', 'Confluence', 'Marketo Engage', 'Tealium iQ Tag Management, EventStream, EventStore, AudienceStore', 'WebAssurance', 'AppAssurance', 'Experience Platform Application Services (AEP App Svc)', 'Digital Experience Analytics Platform', 'Suite Service 360', 'Customer Journey Analytics (CJA) / Adobe Analytics (AA)', 'Customer Intelligence Platform', 'Partnership Cloud', 'Matrixx Digital Commerce Platform', 'Pulse', 'Velocity', 'Dolby Vision Consumer Decoder - Imaging', 'Tempo for Spots', 'BrowserStack Enterprise', 'EP Product

```
Sets', 'Optimize DB2', 'Element Network Manager (ENM)', 'DSL Expresse',
'Confluent Platform (Kafka)', 'PolicyNet Aetheros OS (Operating System)',
'Redis', 'Jira', 'Alfabet', 'LeanIX', 'Abacus', 'ADOIT', 'ARDOQ', 'Capsifi',
'Hopex', 'Enterprise Architect', 'Jalepeno', 'iConectiv - TruOps, TruNumber',
'Boardwalk Application Engine (BAE)', 'TEMS (Test Mobile System)',
'StreamNative', 'Intelligent Data Management Cloud', 'Mechanized Recent Change
(MARCH)', 'Master Location Data / Address Fabric Bundle (MLD/AF Bundle)', 'Aruba
Central License Subscriptions', 'Downdetector', 'CHARON-PAR/PA9', 'Empower',
'MotioPI Pro', 'Cloud', 'Intelligent Data Management Cloud (IDMC)', 'Process
Mining', 'Primetime', 'Business Database', 'Cisco Collaboration Flex Plan
Contact Center', 'Verint Text Analytics']
```

We should take a note for products that have less words in their descriptions as they might have less in contribution to the data modeling

[8]:
```
# Adding a column for character count in the product descriptions
products_df['description_char_count'] = products_df['product_description'].
 ↪apply(lambda x: len(str(x)))

# Plot histogram of character count distribution
plt.figure(figsize=(8, 5))
products_df['description_char_count'].plot(kind='hist', bins=20)
plt.title('Distribution of Product Description Character Count')
plt.xlabel('Character Count')
plt.ylabel('Frequency')
plt.show()
```



After we have visualized the data we will merge the dataset and start looking at similarities/differences between all the different categories

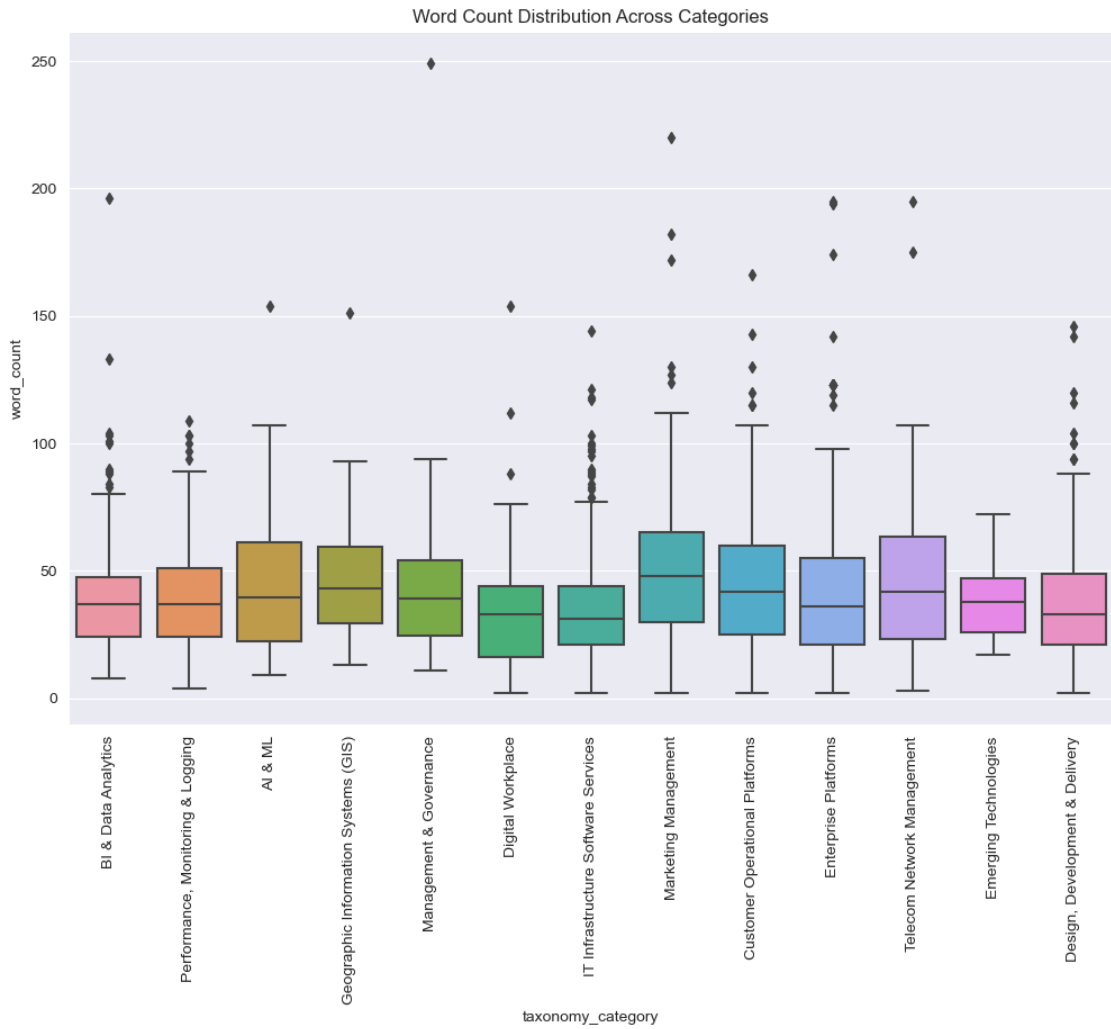
[19]:
```
# Merge products with categories and sub-categories
merged_df = pd.merge(products_df, categories_df, left_on='taxonomy_category',␣
↪right_on='name', how='left')
merged_df = pd.merge(merged_df, sub_categories_df,␣
↪left_on='taxonomy_sub_category', right_on='name', how='left')

# Inspect the merged data
print(merged_df.head())
```

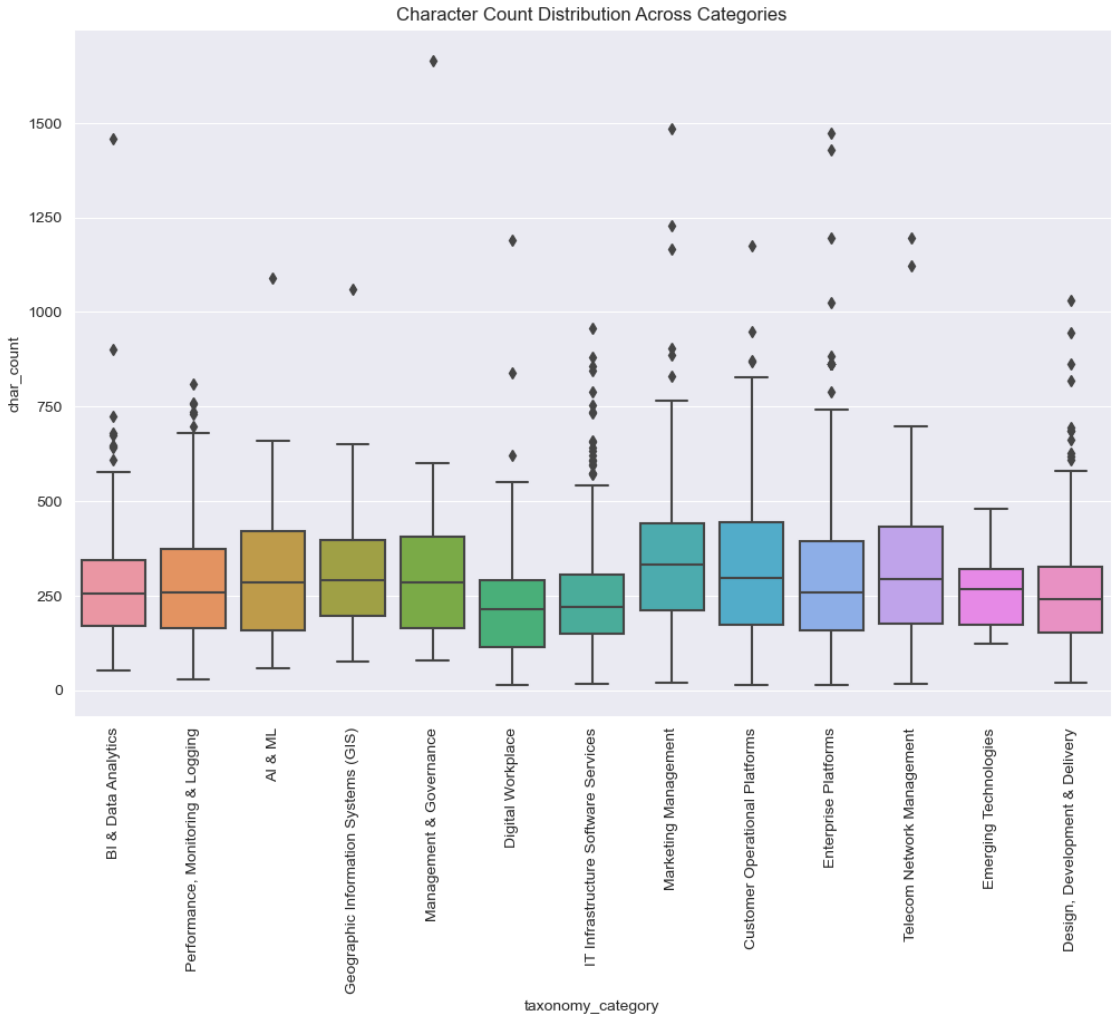
```
                product_name                  vendor_name  \
0         Cloud Secure Agent               INFORMATICA LLC
1  MicroStrategy BI Platform  MICROSTRATEGY SERVICES CORP
2         Signature Services                 QLIKTECH INC
3                     VizLib                 QLIKTECH INC
4     PowerCenter Connector                       ORACLE

     taxonomy_category                      taxonomy_sub_category  \
0  BI & Data Analytics                                Data Governance
1  BI & Data Analytics  Self-Serve Visualization & Ent. Reporting
2  BI & Data Analytics  Self-Serve Visualization & Ent. Reporting
3  BI & Data Analytics  Self-Serve Visualization & Ent. Reporting
4  BI & Data Analytics                    Data Movement Management

                                product_description  word_count  char_count  \
0  The Informatica Cloud Secure Agent is a lightw…          28         202
1  The MicroStrategy platform supports interactiv…          52         433
2  The Signature Services is a package of key ser…          39         260
3  Vizlib is a fully supported third-party visual…          42         286
4  Informatica PowerCenter and PowerConnect Adapt…          21         174

   sentence_count  description_word_count word_count_category  \
0               2                      28               21-50
1               3                      52              51-100
2               2                      39               21-50
3               3                      42               21-50
4               2                      21               21-50

   description_char_count               name_x  \
0                     202  BI & Data Analytics
1                     433  BI & Data Analytics
2                     260  BI & Data Analytics
3                     286  BI & Data Analytics
```

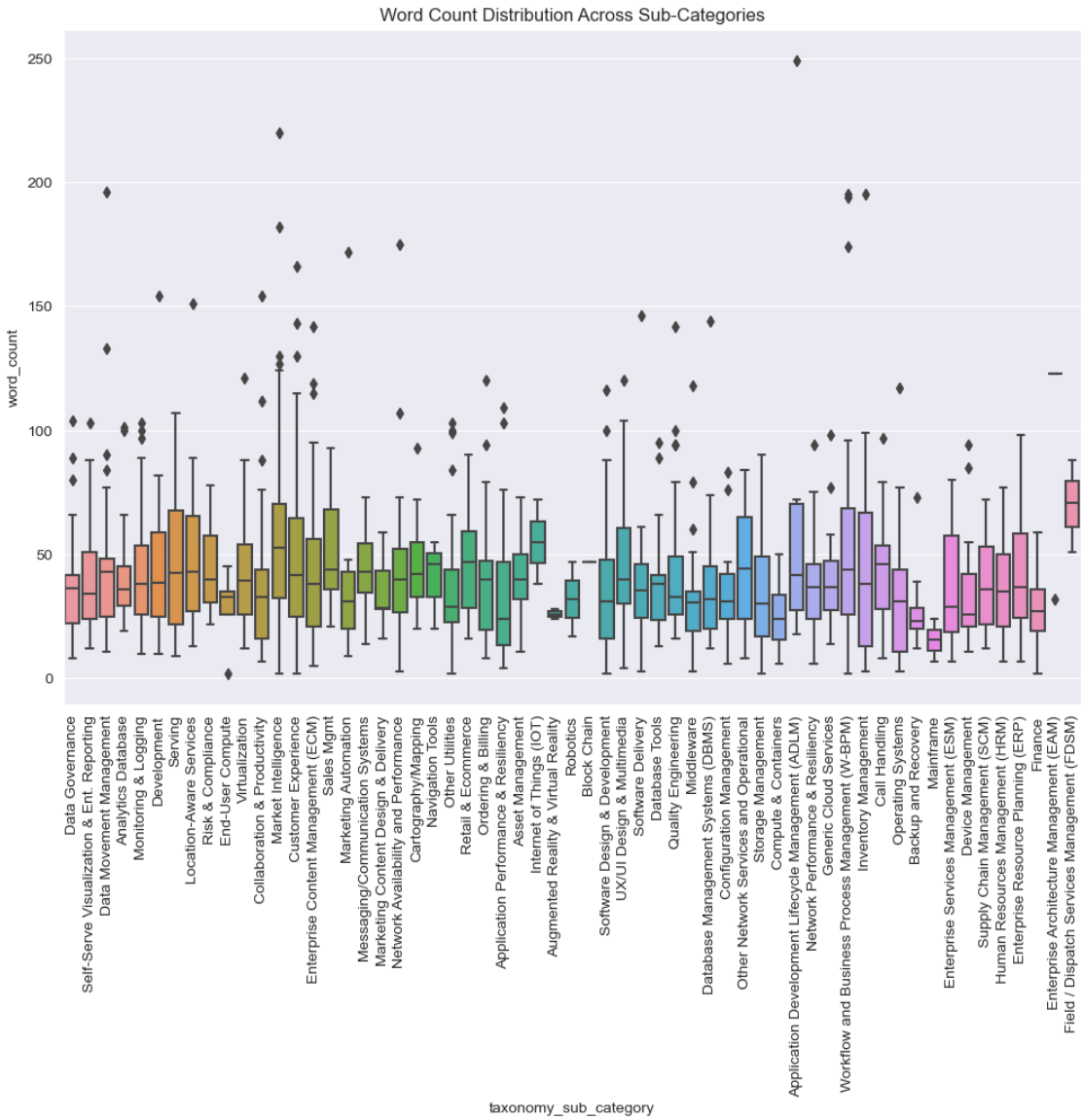
```
4                     174  BI & Data Analytics

                                        definition_x               parent  \
0  Capabilities and Technologies to process, stre…  BI & Data Analytics
1  Capabilities and Technologies to process, stre…  BI & Data Analytics
2  Capabilities and Technologies to process, stre…  BI & Data Analytics
3  Capabilities and Technologies to process, stre…  BI & Data Analytics
4  Capabilities and Technologies to process, stre…  BI & Data Analytics

                                      name_y  \
0                           Data Governance
1  Self-Serve Visualization & Ent. Reporting
2  Self-Serve Visualization & Ent. Reporting
3  Self-Serve Visualization & Ent. Reporting
4                   Data Movement Management

                                        definition_y
0  Data Governance is a collection of practices a…
1  Products that help provide 'Self-Serve Visuali…
2  Products that help provide 'Self-Serve Visuali…
3  Products that help provide 'Self-Serve Visuali…
4  It is a collection of products and technologie…
```

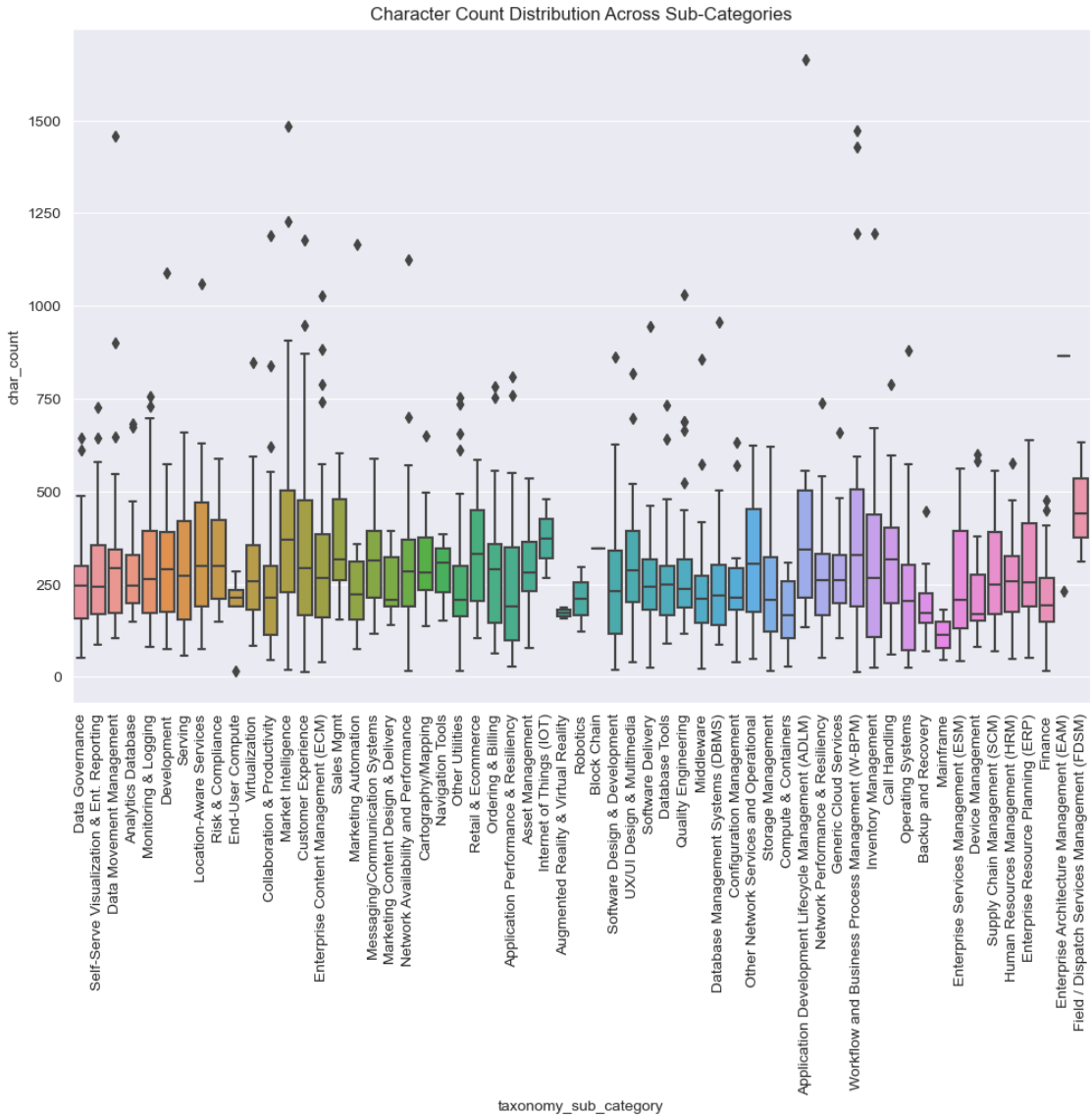
[48]:
```
merged_df['word_count'] = merged_df['product_description'].apply(lambda x:␣
↪len(str(x).split()))
merged_df['char_count'] = merged_df['product_description'].apply(lambda x:␣
↪len(str(x)))

# Visualize word count distribution across categories
plt.figure(figsize=(12, 8))
sns.boxplot(x='taxonomy_category', y='word_count', data=merged_df)
plt.title("Word Count Distribution Across Categories")
plt.xticks(rotation=90)
plt.show()

# Visualize character count distribution across categories
plt.figure(figsize=(12, 8))
sns.boxplot(x='taxonomy_category', y='char_count', data=merged_df)
plt.title("Character Count Distribution Across Categories")
plt.xticks(rotation=90)
plt.show()

# Visualize word count distribution across sub-categories
plt.figure(figsize=(12, 8))
sns.boxplot(x='taxonomy_sub_category', y='word_count', data=merged_df)
plt.title("Word Count Distribution Across Sub-Categories")
plt.xticks(rotation=90)
```

```
plt.show()

# Visualize character count distribution across sub-categories
plt.figure(figsize=(12, 8))
sns.boxplot(x='taxonomy_sub_category', y='char_count', data=merged_df)
plt.title("Character Count Distribution Across Sub-Categories")
plt.xticks(rotation=90)
plt.show()
```




Character Count Distribution Across Categories
char_count
1500
1250
1000
750
500
250
0
BI & Data Analytics
Performance, Monitoring & Logging
AI & ML
Geographic Information Systems (GIS)
Management & Governance
Digital Workplace
IT Infrastructure Software Services
Marketing Management
Customer Operational Platforms
Enterprise Platforms
Telecom Network Management
Emerging Technologies
Design, Development & Delivery
taxonomy_category


Word Count Distribution Across Sub-Categories
word_count
0
50
100
150
200
250
taxonomy_sub_category
Data Governance
Self-Serve Visualization & Ent. Reporting
Data Movement Management
Analytics Database
Monitoring & Logging
Development
Serving
Location-Aware Services
Risk & Compliance
End-User Compute
Virtualization
Collaboration & Productivity
Market Intelligence
Customer Experience
Enterprise Content Management (ECM)
Sales Mgmt
Marketing Automation
Messaging/Communication Systems
Marketing Content Design & Delivery
Network Availability and Performance
Cartography/Mapping
Navigation Tools
Other Utilities
Retail & Ecommerce
Ordering & Billing
Application Performance & Resiliency
Asset Management
Internet of Things (IOT)
Augmented Reality & Virtual Reality
Robotics
Block Chain
Software Design & Development
UX/UI Design & Multimedia
Software Delivery
Database Tools
Quality Engineering
Middleware
Database Management Systems (DBMS)
Configuration Management
Other Network Services and Operational
Storage Management
Compute & Containers
Application Development Lifecycle Management (ADLM)
Network Performance & Resiliency
Generic Cloud Services
Workflow and Business Process Management (W-BPM)
Inventory Management
Call Handling
Operating Systems
Backup and Recovery
Mainframe
Enterprise Services Management (ESM)
Device Management
Supply Chain Management (SCM)
Human Resources Management (HRM)
Enterprise Resource Planning (ERP)
Finance
Enterprise Architecture Management (EAM)
Field / Dispatch Services Management (FDSM)




The word count distribution shows that categories such as **Telecom Network Management**, **Marketing Management**, and **Customer Operational Platforms** have the longest and most variable product descriptions, suggesting these products require more detailed explanations due to their complexity. In contrast, categories like **Digital Workspace** and **Emerging Technologies** exhibit shorter and more consistent word counts, indicating more standardized or straightforward descriptions. The sub-category analysis reveals similar patterns, with sub-categories like **Market intelligence** and **Customer service** and **UI/UX** showing greater variation, while others are more concise. The presence of outliers across both categories and sub-categories indicates that certain products require significantly longer descriptions, which may reflect niche or highly specialized products within these groups. From this we can see which category and sub category tends to have longer description. Below a table is also generated for us to visualize the average word counts across each data, and we can see which ones have a longer description compared to which ones don't

[50]:
```
category_stats = merged_df.groupby('taxonomy_category').agg({
    'word_count': ['mean', 'min', 'max'],
    'char_count': ['mean', 'min', 'max']
}).reset_index()

# Rename columns
category_stats.columns = ['Category', 'Avg Word Count', 'Min Word Count', 'Max␣
↪Word Count', 'Avg Char Count', 'Min Char Count', 'Max Char Count']

# Sort by Avg Word Count (descending) to display categories with longest␣
↪descriptions first
category_stats = category_stats.sort_values(by='Avg Word Count',␣
↪ascending=False)

# Format the results for better readability
category_stats_formatted = category_stats.style.format({
    'Avg Word Count': '{:.2f}',
    'Min Word Count': '{:.0f}',
    'Max Word Count': '{:.0f}',
    'Avg Char Count': '{:.2f}',
    'Min Char Count': '{:.0f}',
    'Max Char Count': '{:.0f}'
})

# Display the category-level statistics in a styled table
print("Category-level statistics (sorted by Avg Word Count):")
display(category_stats_formatted)

# Group by sub-category and compute statistics for word and character count
sub_category_stats = merged_df.groupby('taxonomy_sub_category').agg({
    'word_count': ['mean', 'min', 'max'],
    'char_count': ['mean', 'min', 'max']
}).reset_index()


sub_category_stats.columns = ['Sub-Category', 'Avg Word Count', 'Min Word␣
↪Count', 'Max Word Count', 'Avg Char Count', 'Min Char Count', 'Max Char␣
↪Count']


sub_category_stats = sub_category_stats.sort_values(by='Avg Word Count',␣
↪ascending=False)


sub_category_stats_formatted = sub_category_stats.style.format({
    'Avg Word Count': '{:.2f}',
    'Min Word Count': '{:.0f}',
```

```
    'Max Word Count': '{:.0f}',
    'Avg Char Count': '{:.2f}',
    'Min Char Count': '{:.0f}',
    'Max Char Count': '{:.0f}'
})

print("\nSub-Category-level statistics (sorted by Avg Word Count):")
display(sub_category_stats_formatted)
```

```
Category-level statistics (sorted by Avg Word Count):

<pandas.io.formats.style.Styler at 0x23c90be59d0>


Sub-Category-level statistics (sorted by Avg Word Count):

<pandas.io.formats.style.Styler at 0x23c90b91390>
```

We can use ngram to see the most common words in each category

[52]:
```
from sklearn.feature_extraction.text import CountVectorizer

# tokenization and N-Gram Analysis
vectorizer = CountVectorizer(stop_words='english', ngram_range=(1, 2),␣
 ↪max_features=20)

# apply vectorizer to each category's product descriptions
for category in merged_df['taxonomy_category'].unique():
    category_data = merged_df[merged_df['taxonomy_category'] ==␣
 ↪category]['product_description']
    ngram_matrix = vectorizer.fit_transform(category_data.dropna())

    print(f"Category: {category}")
    print(f"Most common words/n-grams: {vectorizer.get_feature_names_out()}\n")
```

```
Category: BI & Data Analytics
Most common words/n-grams: ['analytics' 'applications' 'based' 'business'
'business intelligence'
 'cloud' 'data' 'enterprise' 'ibm' 'informatica' 'integration'
 'intelligence' 'management' 'platform' 'provides' 'service' 'software'
 'source' 'time' 'users']

Category: Performance, Monitoring & Logging
Most common words/n-grams: ['application' 'applications' 'asg' 'cloud' 'data'
'enterprise'
 'infrastructure' 'management' 'monitor' 'monitoring' 'network'
 'operations' 'performance' 'platform' 'provides' 'service' 'services'
 'software' 'solution' 'time']
```

```
Category: AI & ML
Most common words/n-grams: ['ai' 'analytics' 'applications' 'bots' 'cloud'
'customer' 'data'
 'enables' 'human' 'ibm' 'language' 'learning' 'machine'
 'machine learning' 'natural' 'network' 'platform' 'provides' 'service'
 'speech']

Category: Geographic Information Systems (GIS)
Most common words/n-grams: ['accurate' 'address' 'data' 'information' 'location'
'mapping' 'maps'
 'network' 'postal' 'product' 'provides' 'real' 'real time' 'service'
 'services' 'software' 'street' 'time' 'used' 'usps']

Category: Management & Governance
Most common words/n-grams: ['access' 'agile' 'applications' 'based' 'center'
'cloud' 'data' 'devices'
 'enterprise' 'helps' 'jira' 'manage' 'management' 'mobile' 'platform'
 'project' 'provides' 'risk' 'software' 'solution']

Category: Digital Workplace
Most common words/n-grams: ['applications' 'apps' 'based' 'business' 'cloud'
'collaboration' 'data'
 'designed' 'google' 'management' 'microsoft' 'office' 'platform'
 'project' 'software' 'solution' 'support' 'time' 'user' 'work']

Category: IT Infrastructure Software Services
Most common words/n-grams: ['application' 'applications' 'business' 'cloud'
'data' 'database'
 'enterprise' 'ibm' 'management' 'microsoft' 'open' 'platform' 'provides'
 'server' 'service' 'services' 'software' 'storage' 'systems' 'windows']

Category: Marketing Management
Most common words/n-grams: ['analytics' 'based' 'business' 'cloud' 'customer'
'customers' 'data'
 'digital' 'email' 'experience' 'management' 'marketing' 'mobile'
 'platform' 'product' 'provides' 'real' 'real time' 'service' 'time']

Category: Customer Operational Platforms
Most common words/n-grams: ['based' 'billing' 'business' 'center' 'cloud'
'communications' 'customer'
 'data' 'management' 'oracle' 'oracle communications' 'platform'
 'provides' 'revenue' 'sales' 'service' 'software' 'solution' 'support'
 'time']

Category: Enterprise Platforms
Most common words/n-grams: ['applications' 'based' 'business' 'cloud' 'content'
'data' 'enterprise'
 'help' 'management' 'models' 'platform' 'process' 'processes' 'provides'
```

```
 'sap' 'service' 'software' 'solution' 'support' 'tools']

Category: Telecom Network Management
Most common words/n-grams: ['access' 'application' 'data' 'end' 'management'
'network' 'networks'
 'operations' 'order' 'performance' 'platform' 'provides' 'service'
 'services' 'software' 'time' 'traffic' 'use' 'used' 'work']

Category: Emerging Technologies
Most common words/n-grams: ['3d' 'apps' 'apps apis' 'based' 'cloud' 'computing'
'data' 'developers'
 'iot' 'macrometa' 'platform' 'products' 'reality' 'reconciliation'
 'roaming' 'services' 'settlement' 'stateful' 'web' 'world']

Category: Design, Development & Delivery
Most common words/n-grams: ['application' 'applications' 'cloud' 'code' 'data'
'design' 'developers'
 'development' 'enterprise' 'management' 'mobile' 'platform' 'services'
 'software' 'solution' 'source' 'test' 'testing' 'tools' 'web']
```

[53]:
```python
# n-Gram analysis for sub-categories
for sub_category in merged_df['taxonomy_sub_category'].unique():
    sub_category_data = merged_df[merged_df['taxonomy_sub_category'] ==␣
 ↪sub_category]['product_description']
    ngram_matrix = vectorizer.fit_transform(sub_category_data.dropna())

    print(f"Sub-Category: {sub_category}")
    print(f"Most common words/n-grams: {vectorizer.get_feature_names_out()}\n")
```

```
Sub-Category: Data Governance
Most common words/n-grams: ['analyze' 'applications' 'business' 'catalog'
'cloud' 'country' 'create'
 'data' 'data catalog' 'data governance' 'data quality' 'enterprise'
 'governance' 'ibm' 'informatica' 'informatica data' 'management'
 'organization' 'platform' 'quality']

Sub-Category: Self-Serve Visualization & Ent. Reporting
Most common words/n-grams: ['analysis' 'analytics' 'based' 'bi' 'business'
'business intelligence'
 'cloud' 'data' 'enterprise' 'ibm' 'insights' 'intelligence' 'management'
 'platform' 'reporting' 'software' 'statistical' 'tool' 'users'
 'visualize']

Sub-Category: Data Movement Management
Most common words/n-grams: ['analytics' 'application' 'business' 'cloud'
'consecutive'
 'consecutive month' 'data' 'data integration' 'enterprise' 'ibm'
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 'informatica' 'informatica cloud' 'integration' 'management' 'month'
 'real' 'service' 'test' 'test data' 'time']

Sub-Category: Analytics Database
Most common words/n-grams: ['analytics' 'business' 'cloud' 'control' 'data'
'data platform'
 'database' 'enterprise' 'fully' 'large' 'management' 'open' 'open source'
 'platform' 'processing' 'scale' 'source' 'sql' 'streaming' 'time']

Sub-Category: Monitoring & Logging
Most common words/n-grams: ['application' 'applications' 'asg' 'asg tmon'
'based' 'cloud' 'data'
 'infrastructure' 'management' 'monitor' 'monitoring' 'network'
 'performance' 'platform' 'provides' 'software' 'solution' 'sql' 'systems'
 'tmon']

Sub-Category: Development
Most common words/n-grams: ['ai' 'analytics' 'applications' 'bots' 'build'
'cloud' 'customer' 'data'
 'domino' 'language' 'learning' 'machine' 'machine learning' 'natural'
 'network' 'platform' 'provides' 'service' 'speech' 'text']

Sub-Category: Serving
Most common words/n-grams: ['ai' 'cloud' 'data' 'deliver' 'enables' 'generative'
'generative ai'
 'google' 'human' 'ibm' 'ibm watson' 'idmc' 'informatica'
 'informatica idmc' 'intelligence' 'optimized' 'performance' 'platform'
 'service' 'single']

Sub-Category: Location-Aware Services
Most common words/n-grams: ['accurate' 'address' 'data' 'gis' 'global'
'information' 'location'
 'mobile' 'network' 'postal' 'provides' 'quality' 'real' 'real time'
 'services' 'single' 'software' 'standardized' 'time' 'usps']

Sub-Category: Risk & Compliance
Most common words/n-grams: ['access' 'compliance' 'data' 'enables' 'enterprise'
'integrated' 'jaws'
 'manage' 'management' 'platform' 'policies' 'privacy' 'provides' 'risk'
 'risk management' 'screen' 'software' 'solutions' 'users' 'vendor']

Sub-Category: End-User Compute
Most common words/n-grams: ['access' 'apps' 'apps desktops' 'citrix' 'content'
'control' 'desktops'
 'desktops content' 'device' 'package' 'package studio' 'remote'
 'resources' 'smart' 'smart package' 'solution' 'studio' 'virtual'
 'virtual apps' 'workspace']
```

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Sub-Category: Virtualization
Most common words/n-grams: ['charon' 'cloud' 'desktop' 'hardware' 'industry'
'intel' 'linux'
 'machines' 'multiple' 'operating' 'platform' 'software' 'standard'
 'systems' 'users' 'vax' 'virtual' 'virtual machines' 'vmware' 'windows']

Sub-Category: Collaboration & Productivity
Most common words/n-grams: ['applications' 'based' 'business' 'cloud'
'collaboration' 'data'
 'designed' 'google' 'management' 'microsoft' 'office' 'platform'
 'productivity' 'project' 'provides' 'software' 'support' 'time' 'user'
 'work']

Sub-Category: Market Intelligence
Most common words/n-grams: ['analytics' 'business' 'company' 'customer'
'customers' 'data' 'digital'
 'experience' 'journey' 'management' 'marketing' 'mobile' 'platform'
 'product' 'provides' 'real' 'real time' 'service' 'time' 'web']

Sub-Category: Customer Experience
Most common words/n-grams: ['agent' 'ai' 'analytics' 'based' 'center' 'cloud'
'contact' 'customer'
 'data' 'experience' 'insights' 'interaction' 'management' 'platform'
 'provides' 'service' 'software' 'support' 'time' 'voice']

Sub-Category: Enterprise Content Management (ECM)
Most common words/n-grams: ['applications' 'business' 'cloud' 'content' 'create'
'customer' 'data'
 'document' 'documents' 'enables' 'enterprise' 'ibm' 'information'
 'management' 'platform' 'provides' 'secure' 'software' 'solution' 'time']

Sub-Category: Sales Mgmt
Most common words/n-grams: ['account' 'accounts' 'b2b' 'based' 'communications'
'crm' 'customer'
 'data' 'digital' 'management' 'marketing' 'performance' 'platform' 'reps'
 'revenue' 'sales' 'salesforce' 'solution' 'teams' 'time']

Sub-Category: Marketing Automation
Most common words/n-grams: ['analytics' 'based' 'cloud' 'content' 'crm' 'crm
analytics' 'customer'
 'customers' 'data' 'einstein' 'engage' 'engage customers' 'marketing'
 'platform' 'product' 'sales' 'salesforce' 'service' 'software' 'view']

Sub-Category: Messaging/Communication Systems
Most common words/n-grams: ['allows' 'based' 'browse' 'campaign' 'cloud'
'customer' 'customers'
 'data' 'email' 'emails' 'enterprise' 'help' 'helps' 'management'
 'marketing' 'media' 'messaging' 'platform' 'social' 'social media']
```

```
Sub-Category: Marketing Content Design & Delivery
Most common words/n-grams: ['adobe' 'ai' 'cloud' 'content' 'create' 'creative'
'design' 'digital'
 'direct mail' 'efficiency' 'firefly' 'firefly adobe' 'generative'
 'generative ai' 'marketing' 'media' 'planning' 'platform' 'reporting'
 'web']

Sub-Category: Network Availability and Performance
Most common words/n-grams: ['applications' 'automation' 'cloud' 'data' 'dsl'
'end' 'management'
 'monitoring' 'network' 'networks' 'operations' 'performance' 'platform'
 'provides' 'service' 'services' 'software' 'test' 'traffic' 'used']

Sub-Category: Cartography/Mapping
Most common words/n-grams: ['allows' 'analysis' 'area' 'census' 'create' 'data'
'estimates'
 'geographic' 'location' 'mapping' 'maps' 'population' 'product'
 'provides' 'salesforce' 'service' 'time' 'used' 'user' 'using']

Sub-Category: Navigation Tools
Most common words/n-grams: ['bing' 'conditions' 'directions' 'driving' 'driving
directions'
 'enterprise' 'google' 'imagery' 'mapping' 'mapping service' 'maps'
 'maps web' 'satellite' 'service' 'street' 'traffic' 'traffic conditions'
 'view' 'web' 'web mapping']

Sub-Category: Other Utilities
Most common words/n-grams: ['access' 'applications' 'business' 'cloud' 'control'
'data' 'file' 'ibm'
 'integration' 'management' 'platform' 'provides' 'remote' 'secure'
 'service' 'services' 'software' 'systems' 'terminal' 'windows']

Sub-Category: Retail & Ecommerce
Most common words/n-grams: ['allocation' 'business' 'commerce' 'customer'
'customers' 'flixster'
 'management' 'merchandising' 'open' 'planning' 'platform' 'provides'
 'retail' 'rotten tomatoes' 'software' 'space' 'store' 'tomatoes'
 'unified' 'used']

Sub-Category: Ordering & Billing
Most common words/n-grams: ['billing' 'billing revenue' 'business'
'communications'
 'communications billing' 'customer' 'data' 'end' 'management' 'manager'
 'oracle' 'oracle communications' 'order' 'provides' 'rating' 'revenue'
 'revenue management' 'service' 'services' 'software']

Sub-Category: Application Performance & Resiliency
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Most common words/n-grams: ['application' 'applications' 'data' 'downdetector'
'end' 'issues'
 'management' 'micro focus' 'monitor' 'monitoring' 'network' 'performance'
 'provides' 'sense' 'service' 'services' 'software' 'solutions' 'tems'
 'user']

Sub-Category: Asset Management
Most common words/n-grams: ['applications' 'asset' 'business' 'center' 'cloud'
'configuration'
 'construction' 'data' 'data center' 'discovery' 'helps' 'infrastructure'
 'manage' 'management' 'operations' 'platform' 'real' 'software'
 'solution' 'tririga']

Sub-Category: Internet of Things (IOT)
Most common words/n-grams: ['apis' 'apps' 'apps apis' 'cloud' 'computing' 'data'
'database'
 'developers' 'iot' 'macrometa' 'mobilogix' 'platform' 'processing'
 'processing computing' 'products' 'products tracking' 'project'
 'stateful' 'tightly integrated' 'web']

Sub-Category: Augmented Reality & Virtual Reality
Most common words/n-grams: ['3d' 'labs' 'labs phygital' 'mobile' 'mobile
augmented' 'offline'
 'offline experiences' 'phygital' 'phygital world' 'platform'
 'platform allows' 'products' 'products services' 'reality'
 'reality virtual' 'virtual' 'volumetric content' 'web' 'web based'
 'world']

Sub-Category: Robotics
Most common words/n-grams: ['assistants' 'portion' 'portion work' 'remote'
'remote operator' 'robot'
 'robot capable' 'robots' 'robots designed' 'roll' 'roll slide' 'sending'
 'sending data' 'sensors' 'sensors remote' 'slide' 'slide magnetized'
 'slither' 'slither roll' 'versatile']

Sub-Category: Block Chain
Most common words/n-grams: ['agreements' 'operators' 'operators simplifying'
'paving' 'paving way'
 'processes' 'processes saving' 'reality' 'reconciliation'
 'reconciliation cycles' 'reconciliation roaming' 'remove'
 'remove friction' 'roaming' 'roaming agreements' 'roaming services'
 'saving' 'saving long' 'services' 'settlement']

Sub-Category: Software Design & Development
Most common words/n-grams: ['application' 'applications' 'build' 'business'
'cloud' 'code' 'data'
 'developers' 'development' 'enterprise' 'ibm' 'language' 'mobile'
 'platform' 'provides' 'server' 'software' 'support' 'tools' 'web']
```

```
Sub-Category: UX/UI Design & Multimedia
Most common words/n-grams: ['360' 'applications' 'cloud' 'content' 'design'
'digital' 'dolby'
 'dolby vision' 'format' 'management' 'product' 'services' 'software'
 'source' 'tempo' 'ui' 'vantage' 'video' 'vision' 'web']

Sub-Category: Software Delivery
Most common words/n-grams: ['application' 'applications' 'cloud' 'code' 'cognos'
'continuous' 'data'
 'delivery' 'deploy' 'development' 'devops' 'integration' 'jenkins'
 'management' 'platform' 'security' 'service' 'software' 'solution'
 'source']

Sub-Category: Database Tools
Most common words/n-grams: ['applications' 'cloud' 'data' 'database' 'databases'
'db2' 'development'
 'high' 'ibm' 'ims' 'management' 'oracle' 'performance' 'postgresql'
 'provides' 'relational' 'server' 'solutions' 'sql' 'sql server']

Sub-Category: Quality Engineering
Most common words/n-grams: ['application' 'applications' 'automated'
'automation' 'compuware' 'data'
 'developers' 'development' 'end' 'enterprise' 'evinced' 'mainframe'
 'mobile' 'network' 'performance' 'pro' 'software' 'solution' 'test'
 'testing']

Sub-Category: Middleware
Most common words/n-grams: ['application' 'application server' 'applications'
'based' 'data'
 'enterprise' 'event' 'integration' 'java' 'message' 'messaging'
 'middleware' 'platform' 'provides' 'server' 'service' 'software'
 'streaming' 'video' 'web']

Sub-Category: Database Management Systems (DBMS)
Most common words/n-grams: ['applications' 'data' 'database' 'database
management' 'developed'
 'enterprise' 'management' 'memory' 'mysql' 'nosql' 'nosql database'
 'open' 'open source' 'performance' 'relational' 'relational database'
 'server' 'source' 'sql' 'store']

Sub-Category: Configuration Management
Most common words/n-grams: ['application' 'automate' 'automates' 'cloud' 'code'
'configuration'
 'configuration management' 'data' 'deployment' 'focus' 'infrastructure'
 'management' 'micro' 'micro focus' 'microsoft' 'server' 'software'
 'systems' 'used' 'windows']
```

```
Sub-Category: Other Network Services and Operational
Most common words/n-grams: ['access' 'business' 'data' 'devices' 'fabric'
'management' 'mobile'
 'network' 'networks' 'provides' 'real' 'real time' 'service' 'software'
 'solution' 'support' 'time' 'traffic' 'users' 'using']

Sub-Category: Storage Management
Most common words/n-grams: ['attached' 'cloud' 'data' 'file' 'high' 'ibm'
'management' 'object'
 'object storage' 'performance' 'platform' 'provides' 'salesforce' 'scale'
 'service' 'software' 'solution' 'spectrum' 'storage' 'systems']

Sub-Category: Compute & Containers
Most common words/n-grams: ['amazon' 'applications' 'aws' 'aws services'
'compute' 'container' 'data'
 'distributed applications' 'elastic' 'elastic container' 'kubernetes'
 'lambda' 'managed' 'registry' 'run' 'running' 'service' 'services'
 'software' 'teams']

Sub-Category: Application Development Lifecycle Management (ADLM)
Most common words/n-grams: ['agile' 'atlassian' 'based' 'data' 'development'
'helps' 'jira' 'manage'
 'management' 'platform' 'processes' 'product' 'products' 'project'
 'project management' 'software' 'teams' 'tool' 'tracking' 'work']

Sub-Category: Network Performance & Resiliency
Most common words/n-grams: ['application' 'cisco' 'cloud' 'data' 'helps' 'ibm'
'management'
 'monitoring' 'network' 'network performance' 'operations' 'performance'
 'platform' 'provides' 'service' 'sevone' 'solarwinds' 'solution'
 'virtual' 'visibility']

Sub-Category: Generic Cloud Services
Most common words/n-grams: ['applications' 'aws' 'cloud' 'cloud computing'
'company' 'compute'
 'computing' 'data' 'google' 'google cloud' 'managed' 'management' 'place'
 'platform' 'provides' 'servers' 'service' 'services' 'storage' 'web']

Sub-Category: Workflow and Business Process Management (W-BPM)
Most common words/n-grams: ['applications' 'automation' 'based' 'business'
'cloud' 'data'
 'enterprise' 'management' 'models' 'pega' 'platform' 'process'
 'processes' 'provides' 'services' 'software' 'support' 'systems' 'time'
 'workload']

Sub-Category: Inventory Management
Most common words/n-grams: ['administration' 'application' 'central' 'circuit'
'control' 'data' 'end'
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 'equipment' 'inventory' 'management' 'network' 'office' 'order'
 'provides' 'provisioning' 'service' 'services' 'switch' 'systems' 'work']

Sub-Category: Call Handling
Most common words/n-grams: ['assistance' 'calls' 'center' 'communications'
'contact' 'contact center'
 'customer' 'directory' 'experiences' 'hammer' 'mobile' 'operational'
 'oracle' 'platform' 'scale' 'server' 'services' 'solution' 'time' 'voice']

Sub-Category: Operating Systems
Most common words/n-grams: ['applications' 'available' 'cal' 'cal suite' 'cloud'
'devices'
 'distributed' 'enterprise' 'license' 'linux' 'management' 'microsoft'
 'open source' 'operating' 'server' 'services' 'support' 'systems'
 'windows' 'windows server']

Sub-Category: Backup and Recovery
Most common words/n-grams: ['backup' 'backup recovery' 'backup restore' 'cloud'
'computer' 'data'
 'endpoints' 'enterprise' 'environments' 'management' 'platform'
 'protection' 'provides' 'recovery' 'restore' 'sharepoint' 'software'
 'systems' 'tape' 'virtual']

Sub-Category: Mainframe
Most common words/n-grams: ['analysis' 'management facility' 'merrill' 'merrill
expanded' 'mxg'
 'mxg software' 'package' 'package processes' 'processes'
 'processes management' 'records' 'sas' 'sas based' 'service' 'smf'
 'smf data' 'software' 'software comprehensive' 'software package'
 'statistical']

Sub-Category: Enterprise Services Management (ESM)
Most common words/n-grams: ['citizen' 'customer' 'data' 'instance' 'instances'
'limit' 'management'
 'non' 'non production' 'operations' 'production' 'production 4tb'
 'service' 'servicenow' 'servicenow data' 'services' 'storage'
 'storage limit' 'support' 'tool']

Sub-Category: Device Management
Most common words/n-grams: ['access' 'app' 'appflash' 'applecare' 'cloud'
'device' 'devices'
 'hardware' 'management' 'mobile' 'mobile devices' 'network' 'platform'
 'remote' 'response' 'software' 'support' 'use' 'user' 'vmware']

Sub-Category: Supply Chain Management (SCM)
Most common words/n-grams: ['business' 'chain' 'contract' 'customer' 'data'
'device' 'end'
 'inventory' 'manage' 'management' 'mobile' 'planning' 'product'
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 'provides' 'service' 'software' 'solution' 'supply' 'supply chain'
 'transformation']

Sub-Category: Human Resources Management (HRM)
Most common words/n-grams: ['based' 'business' 'cloud' 'content' 'data'
'employee' 'employees'
 'enterprise' 'experience' 'learning' 'manage' 'management' 'platform'
 'software' 'solution' 'training' 'use' 'used' 'workforce'
 'workforce management']

Sub-Category: Enterprise Resource Planning (ERP)
Most common words/n-grams: ['applications' 'based' 'bi' 'business' 'cloud'
'data' 'enterprise'
 'enterprise resource' 'erp' 'financial' 'management' 'oracle' 'planning'
 'platform' 'sap' 'service' 'services' 'software' 'solution' 'solutions']

Sub-Category: Finance
Most common words/n-grams: ['cloud' 'customer' 'data' 'end' 'enterprise'
'financial' 'management'
 'platform' 'process' 'provides' 'sales' 'sap' 'software' 'solution'
 'solutions' 'suite' 'systems' 'tax' 'use' 'vertex']

Sub-Category: Enterprise Architecture Management (EAM)
Most common words/n-grams: ['architecture' 'artifacts' 'business' 'capture'
'change' 'data'
 'decisions' 'ea' 'ea tools' 'enterprise' 'enterprise architecture'
 'future' 'help' 'metadata artifacts' 'models' 'models capabilities'
 'models combined' 'need' 'shape' 'tools']

Sub-Category: Field / Dispatch Services Management (FDSM)
Most common words/n-grams: ['allow' 'allow track' 'application' 'calendly'
'capabilities' 'field'
 'inventory' 'items' 'oracle' 'problematic forth' 'provides' 'reporting'
 'satellite lte' 'scheduling' 'tags' 'tasks' 'time' 'track' 'track items'
 'vehicles']
```

[54]:
```python
from sklearn.feature_extraction.text import CountVectorizer
import pandas as pd

# Function to get top n words from a corpus
def get_top_n_words(corpus, n=10):
    vec = CountVectorizer(stop_words='english').fit(corpus)
    bag_of_words = vec.transform(corpus)
    sum_words = bag_of_words.sum(axis=0)
    words_freq = [(word, sum_words[0, idx]) for word, idx in vec.vocabulary_.
 ↪items()]
```

```
    words_freq = sorted(words_freq, key = lambda x: x[1], reverse=True)
    return words_freq[:n]

# Get Top 10 Common Words for Each Category
print("Top 10 Common Words by Category:")
for category in merged_df['taxonomy_category'].unique():
    category_data = merged_df[merged_df['taxonomy_category'] ==␣
 ↪category]['product_description'].dropna()
    top_words = get_top_n_words(category_data, 15)
    print(f"\nCategory: {category}")
    print(f"Top 15 common words: {top_words}")

# Get Top 10 Common Words for Each Sub-Category
print("\nTop 10 Common Words by Sub-Category:")
for sub_category in merged_df['taxonomy_sub_category'].unique():
    sub_category_data = merged_df[merged_df['taxonomy_sub_category'] ==␣
 ↪sub_category]['product_description'].dropna()
    top_words = get_top_n_words(sub_category_data, 15)
    print(f"\nSub-Category: {sub_category}")
    print(f"Top 15 common words: {top_words}")
```

```
Top 10 Common Words by Category:

Category: BI & Data Analytics
Top 15 common words: [('data', 256), ('business', 54), ('cloud', 49),
('analytics', 44), ('platform', 40), ('enterprise', 37), ('informatica', 29),
('management', 27), ('intelligence', 23), ('software', 23), ('integration', 22),
('service', 22), ('ibm', 22), ('applications', 19), ('source', 19)]

Category: Performance, Monitoring & Logging
Top 15 common words: [('performance', 81), ('network', 80), ('monitoring', 75),
('data', 70), ('management', 52), ('provides', 38), ('asg', 37), ('application',
36), ('infrastructure', 35), ('monitor', 33), ('software', 33), ('platform',
29), ('solution', 27), ('cloud', 25), ('services', 24)]

Category: AI & ML
Top 15 common words: [('data', 29), ('platform', 16), ('ai', 12),
('applications', 11), ('service', 10), ('network', 9), ('learning', 8),
('cloud', 8), ('natural', 7), ('machine', 7), ('speech', 7), ('analytics', 7),
('bots', 6), ('provides', 6), ('customer', 6)]

Category: Geographic Information Systems (GIS)
Top 15 common words: [('data', 45), ('address', 37), ('location', 23), ('maps',
18), ('time', 13), ('real', 12), ('mapping', 12), ('service', 11),
('information', 10), ('provides', 10), ('postal', 10), ('services', 9),
('street', 9), ('product', 9), ('network', 9)]
```

Category: Management & Governance
Top 15 common words: [('management', 57), ('software', 43), ('data', 35), ('platform', 31), ('cloud', 21), ('manage', 17), ('based', 15), ('solution', 14), ('helps', 13), ('provides', 13), ('devices', 13), ('jira', 13), ('project', 13), ('enterprise', 12), ('center', 12)]

Category: Digital Workplace
Top 15 common words: [('software', 19), ('microsoft', 18), ('management', 18), ('based', 15), ('collaboration', 15), ('apps', 14), ('cloud', 13), ('platform', 12), ('office', 11), ('applications', 10), ('business', 10), ('data', 10), ('solution', 9), ('designed', 9), ('google', 9)]

Category: IT Infrastructure Software Services
Top 15 common words: [('data', 140), ('cloud', 99), ('management', 79), ('database', 72), ('software', 71), ('storage', 62), ('applications', 60), ('service', 57), ('platform', 57), ('provides', 55), ('services', 53), ('server', 52), ('systems', 44), ('enterprise', 44), ('windows', 43)]

Category: Marketing Management
Top 15 common words: [('data', 101), ('customer', 64), ('marketing', 57), ('platform', 54), ('customers', 34), ('business', 31), ('analytics', 30), ('experience', 26), ('service', 25), ('digital', 25), ('mobile', 23), ('based', 21), ('email', 21), ('cloud', 21), ('management', 20)]

Category: Customer Operational Platforms
Top 15 common words: [('customer', 93), ('management', 60), ('data', 51), ('platform', 50), ('sales', 47), ('communications', 44), ('software', 39), ('provides', 38), ('service', 37), ('oracle', 35), ('revenue', 31), ('time', 29), ('based', 29), ('billing', 29), ('business', 28)]

Category: Enterprise Platforms
Top 15 common words: [('data', 125), ('management', 114), ('business', 104), ('enterprise', 89), ('platform', 74), ('cloud', 64), ('software', 58), ('content', 55), ('provides', 46), ('applications', 45), ('solution', 43), ('service', 40), ('processes', 40), ('sap', 39), ('process', 37)]

Category: Telecom Network Management
Top 15 common words: [('network', 78), ('service', 41), ('management', 34), ('provides', 25), ('data', 23), ('software', 21), ('performance', 21), ('end', 19), ('networks', 18), ('services', 18), ('work', 17), ('application', 14), ('access', 13), ('traffic', 12), ('operations', 12)]

Category: Emerging Technologies
Top 15 common words: [('iot', 4), ('web', 4), ('world', 3), ('services', 3), ('reality', 3), ('platform', 3), ('macrometa', 3), ('data', 3), ('mobilogix', 2), ('products', 2), ('3d', 2), ('mobile', 2), ('virtual', 2), ('work', 2), ('based', 2)]

Category: Design, Development & Delivery
Top 15 common words: [('software', 61), ('applications', 60), ('development', 57), ('platform', 45), ('testing', 42), ('application', 41), ('data', 36), ('web', 36), ('code', 35), ('test', 33), ('management', 31), ('cloud', 28), ('enterprise', 28), ('tools', 27), ('solution', 27)]

Top 10 Common Words by Sub-Category:

Sub-Category: Data Governance
Top 15 common words: [('data', 56), ('informatica', 16), ('cloud', 10), ('quality', 9), ('business', 9), ('enterprise', 9), ('governance', 8), ('platform', 7), ('organization', 6), ('management', 6), ('ibm', 5), ('catalog', 5), ('country', 5), ('services', 4), ('applications', 4)]

Sub-Category: Self-Serve Visualization & Ent. Reporting
Top 15 common words: [('data', 61), ('business', 33), ('analytics', 25), ('intelligence', 18), ('platform', 17), ('software', 13), ('cloud', 12), ('bi', 12), ('analysis', 10), ('insights', 10), ('reporting', 9), ('users', 9), ('tool', 8), ('visualize', 8), ('enterprise', 8)]

Sub-Category: Data Movement Management
Top 15 common words: [('data', 83), ('integration', 18), ('cloud', 18), ('service', 14), ('consecutive', 14), ('month', 14), ('informatica', 12), ('enterprise', 11), ('ibm', 10), ('time', 9), ('management', 9), ('test', 8), ('application', 8), ('business', 7), ('real', 7)]

Sub-Category: Analytics Database
Top 15 common words: [('data', 56), ('platform', 12), ('source', 10), ('analytics', 10), ('enterprise', 9), ('cloud', 9), ('open', 7), ('database', 7), ('time', 6), ('streaming', 6), ('processing', 6), ('control', 6), ('scale', 5), ('large', 5), ('management', 5)]

Sub-Category: Monitoring & Logging
Top 15 common words: [('monitoring', 57), ('performance', 49), ('data', 42), ('asg', 37), ('management', 31), ('infrastructure', 29), ('software', 24), ('monitor', 23), ('provides', 23), ('network', 23), ('application', 23), ('tmon', 20), ('platform', 19), ('sql', 18), ('based', 17)]

Sub-Category: Development
Top 15 common words: [('data', 20), ('platform', 13), ('applications', 11), ('network', 9), ('service', 8), ('ai', 7), ('bots', 6), ('customer', 6), ('natural', 6), ('learning', 6), ('speech', 6), ('cloud', 6), ('provides', 5), ('language', 5), ('machine', 5)]

Sub-Category: Serving
Top 15 common words: [('data', 9), ('ai', 5), ('ibm', 4), ('google', 3), ('platform', 3), ('watson', 2), ('analytics', 2), ('human', 2), ('machine', 2), ('learning', 2), ('cloud', 2), ('service', 2), ('intelligence', 2),

('performance', 2), ('informatica', 2)]

Sub-Category: Location-Aware Services
Top 15 common words: [('address', 33), ('data', 26), ('location', 17), ('real', 9), ('time', 8), ('usps', 8), ('quality', 7), ('information', 7), ('provides', 7), ('services', 7), ('postal', 7), ('software', 6), ('single', 6), ('mobile', 6), ('network', 6)]

Sub-Category: Risk & Compliance
Top 15 common words: [('data', 11), ('compliance', 10), ('risk', 9), ('management', 8), ('platform', 7), ('provides', 6), ('users', 6), ('screen', 6), ('manage', 5), ('access', 5), ('program', 4), ('software', 4), ('solutions', 4), ('enables', 4), ('fully', 4)]

Sub-Category: End-User Compute
Top 15 common words: [('apps', 7), ('desktops', 3), ('virtual', 3), ('citrix', 2), ('workspace', 2), ('solution', 2), ('access', 2), ('content', 2), ('resources', 2), ('device', 2), ('control', 2), ('smart', 2), ('package', 2), ('studio', 2), ('remote', 2)]

Sub-Category: Virtualization
Top 15 common words: [('virtual', 17), ('software', 8), ('hardware', 7), ('windows', 7), ('charon', 7), ('vmware', 7), ('linux', 7), ('machines', 6), ('platform', 6), ('cloud', 6), ('standard', 6), ('industry', 5), ('users', 5), ('desktop', 5), ('vax', 5)]

Sub-Category: Collaboration & Productivity
Top 15 common words: [('software', 18), ('microsoft', 18), ('management', 18), ('collaboration', 15), ('based', 14), ('platform', 12), ('cloud', 12), ('office', 11), ('business', 10), ('data', 10), ('google', 9), ('applications', 9), ('teams', 8), ('work', 8), ('designed', 8)]

Sub-Category: Market Intelligence
Top 15 common words: [('data', 91), ('customer', 53), ('platform', 35), ('marketing', 33), ('business', 27), ('analytics', 25), ('digital', 21), ('experience', 20), ('mobile', 20), ('time', 19), ('provides', 18), ('real', 18), ('service', 17), ('customers', 16), ('journey', 14)]

Sub-Category: Customer Experience
Top 15 common words: [('customer', 57), ('center', 22), ('service', 21), ('software', 20), ('contact', 18), ('platform', 18), ('management', 17), ('support', 17), ('analytics', 17), ('provides', 17), ('data', 17), ('experience', 16), ('based', 16), ('insights', 16), ('cloud', 15)]

Sub-Category: Enterprise Content Management (ECM)
Top 15 common words: [('data', 50), ('content', 48), ('management', 33), ('platform', 31), ('business', 26), ('cloud', 21), ('documents', 19), ('software', 17), ('applications', 15), ('document', 15), ('ibm', 15),

('enterprise', 14), ('secure', 14), ('solution', 13), ('create', 12)]

Sub-Category: Sales Mgmt
Top 15 common words: [('sales', 38), ('salesforce', 19), ('customer', 18), ('platform', 16), ('data', 15), ('marketing', 11), ('management', 11), ('crm', 9), ('revenue', 8), ('time', 8), ('communications', 8), ('teams', 7), ('reps', 7), ('solution', 7), ('improve', 6)]

Sub-Category: Marketing Automation
Top 15 common words: [('marketing', 8), ('customers', 8), ('salesforce', 8), ('crm', 6), ('based', 5), ('customer', 5), ('data', 5), ('analytics', 5), ('software', 4), ('sales', 4), ('service', 4), ('cloud', 4), ('content', 3), ('engage', 3), ('view', 3)]

Sub-Category: Messaging/Communication Systems
Top 15 common words: [('email', 17), ('platform', 14), ('marketing', 11), ('customers', 10), ('social', 9), ('messaging', 6), ('emails', 6), ('management', 6), ('customer', 5), ('media', 5), ('based', 5), ('campaign', 5), ('data', 5), ('helps', 4), ('allows', 4)]

Sub-Category: Marketing Content Design & Delivery
Top 15 common words: [('adobe', 7), ('marketing', 5), ('firefly', 5), ('creative', 4), ('design', 3), ('web', 3), ('platform', 3), ('create', 3), ('media', 2), ('planning', 2), ('digital', 2), ('enterprise', 2), ('efficiency', 2), ('reporting', 2), ('content', 2)]

Sub-Category: Network Availability and Performance
Top 15 common words: [('network', 48), ('management', 21), ('performance', 18), ('service', 15), ('software', 15), ('networks', 13), ('test', 11), ('monitoring', 9), ('end', 9), ('provides', 8), ('used', 8), ('platform', 8), ('dsl', 8), ('automation', 7), ('applications', 7)]

Sub-Category: Cartography/Mapping
Top 15 common words: [('data', 18), ('maps', 12), ('mapping', 7), ('location', 6), ('product', 6), ('create', 5), ('user', 4), ('using', 4), ('analysis', 4), ('used', 4), ('service', 4), ('time', 4), ('salesforce', 4), ('population', 4), ('estimates', 4)]

Sub-Category: Navigation Tools
Top 15 common words: [('maps', 5), ('web', 3), ('service', 3), ('street', 3), ('view', 3), ('bing', 3), ('google', 2), ('mapping', 2), ('satellite', 2), ('imagery', 2), ('aerial', 2), ('traffic', 2), ('conditions', 2), ('driving', 2), ('directions', 2)]

Sub-Category: Other Utilities
Top 15 common words: [('data', 16), ('business', 15), ('provides', 15), ('terminal', 14), ('file', 12), ('systems', 12), ('access', 12), ('service', 11), ('services', 11), ('ibm', 11), ('platform', 10), ('windows', 10),

('secure', 10), ('cloud', 9), ('remote', 8)]

Sub-Category: Retail & Ecommerce
Top 15 common words: [('commerce', 9), ('platform', 8), ('store', 7), ('retail', 6), ('merchandising', 6), ('provides', 6), ('space', 6), ('unified', 5), ('software', 5), ('used', 4), ('planning', 4), ('management', 4), ('customers', 4), ('business', 4), ('create', 3)]

Sub-Category: Ordering & Billing
Top 15 common words: [('oracle', 32), ('communications', 31), ('management', 28), ('billing', 26), ('revenue', 19), ('data', 18), ('manager', 17), ('customer', 15), ('order', 14), ('provides', 11), ('end', 10), ('business', 10), ('services', 10), ('service', 10), ('software', 9)]

Sub-Category: Application Performance & Resiliency
Top 15 common words: [('monitoring', 9), ('performance', 9), ('network', 9), ('end', 7), ('management', 6), ('service', 6), ('services', 6), ('monitor', 6), ('software', 5), ('data', 5), ('applications', 5), ('user', 5), ('downdetector', 5), ('provides', 4), ('application', 4)]

Sub-Category: Asset Management
Top 15 common words: [('software', 19), ('management', 18), ('data', 17), ('cloud', 11), ('platform', 9), ('center', 9), ('asset', 8), ('infrastructure', 7), ('solution', 7), ('applications', 7), ('discovery', 6), ('operations', 5), ('helps', 5), ('manage', 5), ('configuration', 5)]

Sub-Category: Internet of Things (IOT)
Top 15 common words: [('iot', 3), ('macrometa', 3), ('mobilogix', 2), ('data', 2), ('computing', 2), ('cloud', 2), ('web', 2), ('developers', 2), ('stateful', 2), ('apps', 2), ('apis', 2), ('database', 2), ('platform', 2), ('designs', 1), ('develops', 1)]

Sub-Category: Augmented Reality & Virtual Reality
Top 15 common words: [('3d', 2), ('reality', 2), ('virtual', 2), ('web', 2), ('world', 2), ('evercoast', 1), ('advancing', 1), ('creation', 1), ('holographic', 1), ('volumetric', 1), ('content', 1), ('used', 1), ('mobile', 1), ('augmented', 1), ('desktop', 1)]

Sub-Category: Robotics
Top 15 common words: [('uipath', 1), ('attended', 1), ('robots', 1), ('designed', 1), ('personal', 1), ('assistants', 1), ('supporting', 1), ('staff', 1), ('automating', 1), ('portion', 1), ('work', 1), ('guardian', 1), ('versatile', 1), ('snake', 1), ('robot', 1)]

Sub-Category: Block Chain
Top 15 common words: [('settlement', 2), ('reconciliation', 2), ('roaming', 2), ('clear', 1), ('developer', 1), ('blockchain', 1), ('based', 1), ('clearing', 1), ('networks', 1), ('remove', 1), ('friction', 1), ('complex', 1), ('b2b', 1),

('trade', 1), ('enabling', 1)]

Sub-Category: Software Design & Development
Top 15 common words: [('applications', 39), ('development', 39), ('software', 28), ('platform', 26), ('web', 22), ('code', 19), ('application', 19), ('developers', 17), ('server', 17), ('enterprise', 17), ('data', 16), ('cloud', 16), ('tools', 16), ('business', 16), ('mobile', 14)]

Sub-Category: UX/UI Design & Multimedia
Top 15 common words: [('design', 11), ('digital', 9), ('video', 8), ('content', 8), ('vantage', 8), ('web', 7), ('software', 6), ('ui', 6), ('tempo', 6), ('360', 6), ('applications', 5), ('services', 5), ('format', 5), ('dolby', 5), ('source', 5)]

Sub-Category: Software Delivery
Top 15 common words: [('code', 16), ('software', 12), ('management', 12), ('platform', 10), ('development', 9), ('source', 8), ('continuous', 8), ('service', 8), ('devops', 8), ('security', 7), ('application', 7), ('solution', 7), ('jenkins', 7), ('infrastructure', 6), ('integration', 6)]

Sub-Category: Database Tools
Top 15 common words: [('database', 19), ('data', 17), ('sql', 13), ('oracle', 12), ('management', 10), ('databases', 9), ('postgresql', 8), ('server', 8), ('cloud', 7), ('performance', 7), ('applications', 7), ('development', 7), ('ibm', 6), ('db2', 6), ('solutions', 6)]

Sub-Category: Quality Engineering
Top 15 common words: [('testing', 26), ('test', 20), ('software', 15), ('application', 14), ('network', 11), ('applications', 10), ('data', 10), ('performance', 9), ('mainframe', 9), ('solution', 8), ('mobile', 7), ('compuware', 7), ('evinced', 7), ('pro', 6), ('development', 6)]

Sub-Category: Middleware
Top 15 common words: [('platform', 17), ('application', 14), ('data', 12), ('applications', 12), ('server', 12), ('service', 10), ('streaming', 9), ('software', 8), ('enterprise', 8), ('messaging', 7), ('web', 7), ('integration', 7), ('provides', 6), ('video', 6), ('java', 6)]

Sub-Category: Database Management Systems (DBMS)
Top 15 common words: [('database', 47), ('data', 26), ('management', 19), ('open', 14), ('source', 14), ('relational', 13), ('nosql', 12), ('server', 9), ('store', 9), ('memory', 9), ('performance', 8), ('sql', 8), ('developed', 8), ('applications', 8), ('high', 7)]

Sub-Category: Configuration Management
Top 15 common words: [('management', 15), ('software', 9), ('configuration', 9), ('data', 7), ('infrastructure', 6), ('cloud', 6), ('application', 5), ('systems', 5), ('microsoft', 5), ('deployment', 4), ('code', 4), ('windows',

4), ('automate', 4), ('automates', 4), ('used', 4)]

Sub-Category: Other Network Services and Operational
Top 15 common words: [('network', 15), ('data', 11), ('provides', 10), ('service', 10), ('mobile', 8), ('business', 7), ('software', 6), ('users', 6), ('time', 6), ('networks', 5), ('management', 5), ('traffic', 5), ('using', 5), ('access', 5), ('support', 5)]

Sub-Category: Storage Management
Top 15 common words: [('storage', 45), ('data', 38), ('cloud', 13), ('file', 12), ('software', 11), ('spectrum', 11), ('provides', 10), ('systems', 10), ('scale', 9), ('high', 9), ('ibm', 9), ('platform', 8), ('object', 7), ('service', 7), ('solution', 7)]

Sub-Category: Compute & Containers
Top 15 common words: [('service', 8), ('aws', 7), ('amazon', 5), ('applications', 4), ('container', 4), ('software', 3), ('kubernetes', 3), ('run', 3), ('data', 3), ('teams', 2), ('managing', 2), ('running', 2), ('use', 2), ('services', 2), ('distributed', 2)]

Sub-Category: Application Development Lifecycle Management (ADLM)
Top 15 common words: [('management', 27), ('software', 13), ('jira', 13), ('agile', 11), ('project', 11), ('platform', 9), ('product', 9), ('manage', 7), ('atlassian', 6), ('data', 6), ('based', 6), ('teams', 5), ('tool', 5), ('processes', 5), ('development', 5)]

Sub-Category: Network Performance & Resiliency
Top 15 common words: [('network', 48), ('performance', 23), ('data', 23), ('management', 15), ('provides', 11), ('solution', 10), ('solarwinds', 10), ('monitoring', 9), ('application', 9), ('visibility', 8), ('cisco', 8), ('operations', 8), ('platform', 8), ('virtual', 7), ('cloud', 7)]

Sub-Category: Generic Cloud Services
Top 15 common words: [('cloud', 37), ('google', 20), ('services', 14), ('aws', 10), ('applications', 8), ('computing', 8), ('data', 8), ('web', 6), ('storage', 6), ('managed', 6), ('management', 4), ('place', 4), ('servers', 4), ('platform', 4), ('compute', 4)]

Sub-Category: Workflow and Business Process Management (W-BPM)
Top 15 common words: [('business', 39), ('process', 16), ('data', 16), ('enterprise', 14), ('automation', 11), ('pega', 11), ('management', 11), ('platform', 10), ('processes', 9), ('cloud', 9), ('workload', 8), ('provides', 8), ('time', 8), ('support', 8), ('based', 8)]

Sub-Category: Inventory Management
Top 15 common words: [('work', 17), ('service', 16), ('network', 15), ('circuit', 10), ('order', 9), ('management', 8), ('administration', 8), ('services', 8), ('provides', 7), ('office', 7), ('application', 6),

('inventory', 6), ('end', 6), ('control', 6), ('provisioning', 6)]

Sub-Category: Call Handling
Top 15 common words: [('services', 8), ('voice', 7), ('customer', 6), ('communications', 6), ('solution', 5), ('center', 5), ('assistance', 5), ('time', 4), ('experiences', 4), ('scale', 4), ('platform', 4), ('contact', 4), ('calls', 4), ('directory', 4), ('mobile', 4)]

Sub-Category: Operating Systems
Top 15 common words: [('windows', 12), ('operating', 12), ('server', 9), ('microsoft', 8), ('support', 7), ('linux', 6), ('distributed', 6), ('license', 6), ('services', 5), ('devices', 4), ('management', 4), ('available', 4), ('enterprise', 4), ('things', 3), ('software', 3)]

Sub-Category: Backup and Recovery
Top 15 common words: [('backup', 15), ('recovery', 11), ('data', 7), ('management', 6), ('provides', 4), ('enterprise', 4), ('virtual', 4), ('cloud', 4), ('computer', 4), ('software', 4), ('tape', 3), ('protection', 3), ('restore', 3), ('environments', 3), ('platform', 3)]

Sub-Category: Mainframe
Top 15 common words: [('software', 2), ('kyndryl', 1), ('ibm', 1), ('mainframe', 1), ('service', 1), ('merrill', 1), ('expanded', 1), ('guide', 1), ('mxg', 1), ('comprehensive', 1), ('statistical', 1), ('analysis', 1), ('sas', 1), ('based', 1), ('package', 1)]

Sub-Category: Enterprise Services Management (ESM)
Top 15 common words: [('management', 14), ('non', 8), ('production', 7), ('servicenow', 5), ('customer', 5), ('data', 5), ('support', 5), ('service', 4), ('operations', 4), ('storage', 4), ('limit', 4), ('user', 3), ('tool', 3), ('applications', 3), ('infrastructure', 3)]

Sub-Category: Device Management
Top 15 common words: [('devices', 11), ('remote', 7), ('software', 7), ('platform', 6), ('support', 5), ('device', 5), ('access', 5), ('response', 5), ('app', 4), ('use', 4), ('mobile', 4), ('management', 4), ('cloud', 4), ('network', 4), ('vmware', 3)]

Sub-Category: Supply Chain Management (SCM)
Top 15 common words: [('management', 11), ('service', 8), ('supply', 7), ('chain', 7), ('provides', 7), ('software', 6), ('data', 5), ('business', 4), ('planning', 4), ('solution', 4), ('end', 4), ('manage', 4), ('inventory', 4), ('customer', 4), ('mobile', 4)]

Sub-Category: Human Resources Management (HRM)
Top 15 common words: [('management', 21), ('platform', 18), ('learning', 12), ('workforce', 9), ('training', 9), ('based', 8), ('employee', 8), ('enterprise', 8), ('solution', 8), ('business', 7), ('cloud', 6), ('software', 6), ('content',

```
6), ('manage', 5), ('experience', 5)]

Sub-Category: Enterprise Resource Planning (ERP)
Top 15 common words: [('cloud', 19), ('sap', 19), ('business', 14),
('management', 9), ('software', 9), ('erp', 8), ('data', 8), ('enterprise', 8),
('services', 8), ('applications', 7), ('solutions', 6), ('solution', 6),
('service', 6), ('oracle', 5), ('bi', 5)]

Sub-Category: Finance
Top 15 common words: [('tax', 24), ('data', 18), ('management', 14), ('process',
11), ('solutions', 11), ('sales', 11), ('software', 11), ('sap', 9),
('platform', 9), ('end', 9), ('enterprise', 9), ('financial', 9), ('vertex', 8),
('provides', 8), ('suite', 6)]

Sub-Category: Enterprise Architecture Management (EAM)
Top 15 common words: [('enterprise', 33), ('models', 24), ('help', 24), ('data',
17), ('ea', 16), ('tools', 16), ('capture', 16), ('artifacts', 16), ('shape',
16), ('architecture', 9), ('change', 9), ('future', 9), ('decisions', 9),
('business', 9), ('allow', 8)]

Sub-Category: Field / Dispatch Services Management (FDSM)
Top 15 common words: [('time', 3), ('inventory', 3), ('calendly', 3), ('field',
2), ('provides', 2), ('scheduling', 2), ('tasks', 2), ('application', 2),
('capabilities', 2), ('oracle', 2), ('vehicles', 2), ('allow', 2), ('track', 2),
('items', 2), ('tags', 2)]
```

[55]:
```python
from sklearn.feature_extraction.text import TfidfVectorizer

# Function to get top n unique words using TF-IDF
def get_top_tfidf_words(corpus, n=10):
    tfidf_vectorizer = TfidfVectorizer(stop_words='english', max_features=n)
    tfidf_matrix = tfidf_vectorizer.fit_transform(corpus)
    feature_names = tfidf_vectorizer.get_feature_names_out()
    return feature_names

# Get Top 10 Unique Words for Each Category
print("Top 10 Unique Words by Category (using TF-IDF):")
for category in merged_df['taxonomy_category'].unique():
    category_data = merged_df[merged_df['taxonomy_category'] ==␣
 ↪category]['product_description'].dropna()
    top_unique_words = get_top_tfidf_words(category_data, 10)
    print(f"\nCategory: {category}")
    print(f"Top 10 unique words: {top_unique_words}")

# Get Top 10 Unique Words for Each Sub-Category
print("\nTop 10 Unique Words by Sub-Category (using TF-IDF):")
for sub_category in merged_df['taxonomy_sub_category'].unique():
```

```
    sub_category_data = merged_df[merged_df['taxonomy_sub_category'] ==␣
↪sub_category]['product_description'].dropna()
    top_unique_words = get_top_tfidf_words(sub_category_data, 10)
    print(f"\nSub-Category: {sub_category}")
    print(f"Top 10 unique words: {top_unique_words}")
```

```
Top 10 Unique Words by Category (using TF-IDF):

Category: BI & Data Analytics
Top 10 unique words: ['analytics' 'business' 'cloud' 'data' 'enterprise'
'informatica'
 'intelligence' 'management' 'platform' 'software']

Category: Performance, Monitoring & Logging
Top 10 unique words: ['application' 'asg' 'data' 'infrastructure' 'management'
'monitoring'
 'network' 'performance' 'provides' 'software']

Category: AI & ML
Top 10 unique words: ['ai' 'analytics' 'applications' 'cloud' 'data' 'learning'
'natural'
 'network' 'platform' 'service']

Category: Geographic Information Systems (GIS)
Top 10 unique words: ['address' 'data' 'location' 'mapping' 'maps' 'postal'
'provides' 'real'
 'service' 'time']

Category: Management & Governance
Top 10 unique words: ['based' 'cloud' 'data' 'manage' 'management' 'platform'
'project'
 'provides' 'software' 'solution']

Category: Digital Workplace
Top 10 unique words: ['applications' 'apps' 'based' 'cloud' 'collaboration'
'management'
 'microsoft' 'office' 'platform' 'software']

Category: IT Infrastructure Software Services
Top 10 unique words: ['applications' 'cloud' 'data' 'database' 'management'
'platform'
 'provides' 'service' 'software' 'storage']

Category: Marketing Management
Top 10 unique words: ['analytics' 'business' 'customer' 'customers' 'data'
'digital'
 'experience' 'marketing' 'platform' 'service']
```

```
Category: Customer Operational Platforms
Top 10 unique words: ['communications' 'customer' 'data' 'management' 'oracle'
'platform'
 'provides' 'sales' 'service' 'software']

Category: Enterprise Platforms
Top 10 unique words: ['applications' 'business' 'cloud' 'content' 'data'
'enterprise'
 'management' 'platform' 'provides' 'software']

Category: Telecom Network Management
Top 10 unique words: ['data' 'end' 'management' 'network' 'networks'
'performance' 'provides'
 'service' 'services' 'software']

Category: Emerging Technologies
Top 10 unique words: ['3d' 'apis' 'data' 'iot' 'macrometa' 'platform' 'reality'
'services'
 'web' 'world']

Category: Design, Development & Delivery
Top 10 unique words: ['application' 'applications' 'code' 'data' 'development'
'platform'
 'software' 'test' 'testing' 'web']

Top 10 Unique Words by Sub-Category (using TF-IDF):

Sub-Category: Data Governance
Top 10 unique words: ['business' 'cloud' 'data' 'enterprise' 'governance'
'informatica'
 'management' 'organization' 'platform' 'quality']

Sub-Category: Self-Serve Visualization & Ent. Reporting
Top 10 unique words: ['analysis' 'analytics' 'bi' 'business' 'cloud' 'data'
'insights'
 'intelligence' 'platform' 'software']

Sub-Category: Data Movement Management
Top 10 unique words: ['cloud' 'consecutive' 'data' 'enterprise' 'ibm'
'informatica'
 'integration' 'management' 'month' 'service']

Sub-Category: Analytics Database
Top 10 unique words: ['analytics' 'cloud' 'control' 'data' 'database'
'enterprise' 'open'
 'platform' 'source' 'streaming']
```

```
Sub-Category: Monitoring & Logging
Top 10 unique words: ['asg' 'data' 'infrastructure' 'management' 'monitor'
'monitoring'
 'network' 'performance' 'provides' 'software']

Sub-Category: Development
Top 10 unique words: ['ai' 'applications' 'bots' 'customer' 'data' 'learning'
'network'
 'platform' 'service' 'speech']

Sub-Category: Serving
Top 10 unique words: ['ai' 'data' 'duet' 'enables' 'google' 'ibm' 'machine'
'platform'
 'service' 'single']

Sub-Category: Location-Aware Services
Top 10 unique words: ['address' 'data' 'information' 'location' 'postal'
'provides' 'quality'
 'real' 'time' 'usps']

Sub-Category: Risk & Compliance
Top 10 unique words: ['access' 'compliance' 'data' 'manage' 'management'
'platform' 'provides'
 'risk' 'screen' 'users']

Sub-Category: End-User Compute
Top 10 unique words: ['access' 'apps' 'desktops' 'package' 'remote' 'resources'
'smart'
 'solution' 'studio' 'virtual']

Sub-Category: Virtualization
Top 10 unique words: ['charon' 'cloud' 'hardware' 'linux' 'machines' 'software'
'standard'
 'virtual' 'vmware' 'windows']

Sub-Category: Collaboration & Productivity
Top 10 unique words: ['based' 'business' 'cloud' 'collaboration' 'data'
'management'
 'microsoft' 'office' 'platform' 'software']

Sub-Category: Market Intelligence
Top 10 unique words: ['analytics' 'business' 'customer' 'data' 'digital'
'experience'
 'marketing' 'mobile' 'platform' 'time']

Sub-Category: Customer Experience
Top 10 unique words: ['center' 'contact' 'customer' 'data' 'management'
'platform' 'provides'
```

```
 'service' 'software' 'support']

Sub-Category: Enterprise Content Management (ECM)
Top 10 unique words: ['business' 'cloud' 'content' 'data' 'document' 'documents'
'ibm'
 'management' 'platform' 'software']

Sub-Category: Sales Mgmt
Top 10 unique words: ['communications' 'crm' 'customer' 'data' 'management'
'marketing'
 'platform' 'revenue' 'sales' 'salesforce']

Sub-Category: Marketing Automation
Top 10 unique words: ['analytics' 'based' 'cloud' 'crm' 'customer' 'customers'
'data'
 'marketing' 'salesforce' 'software']

Sub-Category: Messaging/Communication Systems
Top 10 unique words: ['based' 'customer' 'customers' 'email' 'emails'
'management' 'marketing'
 'messaging' 'platform' 'social']

Sub-Category: Marketing Content Design & Delivery
Top 10 unique words: ['adobe' 'create' 'creative' 'design' 'digital' 'direct'
'firefly'
 'marketing' 'platform' 'web']

Sub-Category: Network Availability and Performance
Top 10 unique words: ['end' 'management' 'monitoring' 'network' 'networks'
'performance'
 'provides' 'service' 'software' 'test']

Sub-Category: Cartography/Mapping
Top 10 unique words: ['analysis' 'create' 'data' 'estimates' 'location'
'mapping' 'maps'
 'product' 'service' 'time']

Sub-Category: Navigation Tools
Top 10 unique words: ['bing' 'directions' 'driving' 'enterprise' 'maps'
'service' 'street'
 'traffic' 'view' 'web']

Sub-Category: Other Utilities
Top 10 unique words: ['access' 'business' 'data' 'file' 'ibm' 'provides'
'service' 'services'
 'systems' 'terminal']

Sub-Category: Retail & Ecommerce
```

```
Top 10 unique words: ['commerce' 'merchandising' 'platform' 'provides' 'retail'
'software'
 'space' 'store' 'unified' 'used']

Sub-Category: Ordering & Billing
Top 10 unique words: ['billing' 'communications' 'customer' 'data' 'management'
'manager'
 'oracle' 'order' 'provides' 'revenue']

Sub-Category: Application Performance & Resiliency
Top 10 unique words: ['downdetector' 'end' 'management' 'monitor' 'monitoring'
'network'
 'performance' 'service' 'services' 'user']

Sub-Category: Asset Management
Top 10 unique words: ['applications' 'asset' 'center' 'cloud' 'data'
'infrastructure'
 'management' 'platform' 'software' 'solution']

Sub-Category: Internet of Things (IOT)
Top 10 unique words: ['cloud' 'computing' 'data' 'database' 'developers' 'iot'
'macrometa'
 'mobilogix' 'platform' 'web']

Sub-Category: Augmented Reality & Virtual Reality
Top 10 unique words: ['3d' 'advancing' 'brands' 'reality' 'services' 'used'
'virtual'
 'volumetric' 'web' 'world']

Sub-Category: Robotics
Top 10 unique words: ['assistants' 'remote' 'robot' 'robots' 'roll' 'sending'
'sensors' 'slide'
 'slither' 'snake']

Sub-Category: Block Chain
Top 10 unique words: ['agreements' 'reality' 'reconciliation' 'remove' 'roaming'
'saving'
 'services' 'settlement' 'simplifying' 'trade']

Sub-Category: Software Design & Development
Top 10 unique words: ['application' 'applications' 'code' 'developers'
'development'
 'enterprise' 'platform' 'server' 'software' 'web']

Sub-Category: UX/UI Design & Multimedia
Top 10 unique words: ['360' 'content' 'design' 'digital' 'software' 'tempo' 'ui'
'vantage'
 'video' 'web']
```

```
Sub-Category: Software Delivery
Top 10 unique words: ['code' 'continuous' 'development' 'devops' 'jenkins'
'management'
 'platform' 'service' 'software' 'source']

Sub-Category: Database Tools
Top 10 unique words: ['cloud' 'data' 'database' 'databases' 'management'
'oracle' 'performance'
 'postgresql' 'server' 'sql']

Sub-Category: Quality Engineering
Top 10 unique words: ['application' 'applications' 'data' 'mainframe' 'network'
'performance'
 'software' 'solution' 'test' 'testing']

Sub-Category: Middleware
Top 10 unique words: ['application' 'applications' 'data' 'enterprise'
'platform' 'server'
 'service' 'software' 'streaming' 'web']

Sub-Category: Database Management Systems (DBMS)
Top 10 unique words: ['data' 'database' 'management' 'memory' 'nosql' 'open'
'relational'
 'server' 'source' 'store']

Sub-Category: Configuration Management
Top 10 unique words: ['application' 'cloud' 'configuration' 'data' 'focus'
'infrastructure'
 'management' 'microsoft' 'software' 'systems']

Sub-Category: Other Network Services and Operational
Top 10 unique words: ['business' 'data' 'mobile' 'network' 'provides' 'service'
'software'
 'time' 'users' 'using']

Sub-Category: Storage Management
Top 10 unique words: ['cloud' 'data' 'file' 'ibm' 'provides' 'scale' 'software'
'spectrum'
 'storage' 'systems']

Sub-Category: Compute & Containers
Top 10 unique words: ['amazon' 'applications' 'aws' 'container' 'data'
'kubernetes' 'lambda'
 'run' 'service' 'software']

Sub-Category: Application Development Lifecycle Management (ADLM)
Top 10 unique words: ['agile' 'atlassian' 'data' 'jira' 'manage' 'management'
```

```
'platform'
 'product' 'project' 'software']

Sub-Category: Network Performance & Resiliency
Top 10 unique words: ['application' 'data' 'management' 'monitoring' 'network'
'performance'
 'platform' 'provides' 'solarwinds' 'solution']

Sub-Category: Generic Cloud Services
Top 10 unique words: ['applications' 'aws' 'cloud' 'computing' 'data' 'google'
'managed'
 'services' 'storage' 'web']

Sub-Category: Workflow and Business Process Management (W-BPM)
Top 10 unique words: ['automation' 'business' 'cloud' 'data' 'enterprise'
'management' 'pega'
 'platform' 'process' 'processes']

Sub-Category: Inventory Management
Top 10 unique words: ['administration' 'circuit' 'management' 'network' 'office'
'order'
 'provides' 'service' 'services' 'work']

Sub-Category: Call Handling
Top 10 unique words: ['assistance' 'center' 'communications' 'customer' 'oracle'
'scale'
 'server' 'services' 'solution' 'voice']

Sub-Category: Operating Systems
Top 10 unique words: ['devices' 'distributed' 'license' 'linux' 'microsoft'
'operating'
 'server' 'services' 'support' 'windows']

Sub-Category: Backup and Recovery
Top 10 unique words: ['backup' 'cloud' 'computer' 'data' 'enterprise'
'management' 'provides'
 'recovery' 'software' 'virtual']

Sub-Category: Mainframe
Top 10 unique words: ['analysis' 'merrill' 'mxg' 'package' 'processes' 'records'
'sas'
 'service' 'smf' 'software']

Sub-Category: Enterprise Services Management (ESM)
Top 10 unique words: ['customer' 'data' 'limit' 'management' 'non' 'operations'
'production'
 'service' 'servicenow' 'support']
```

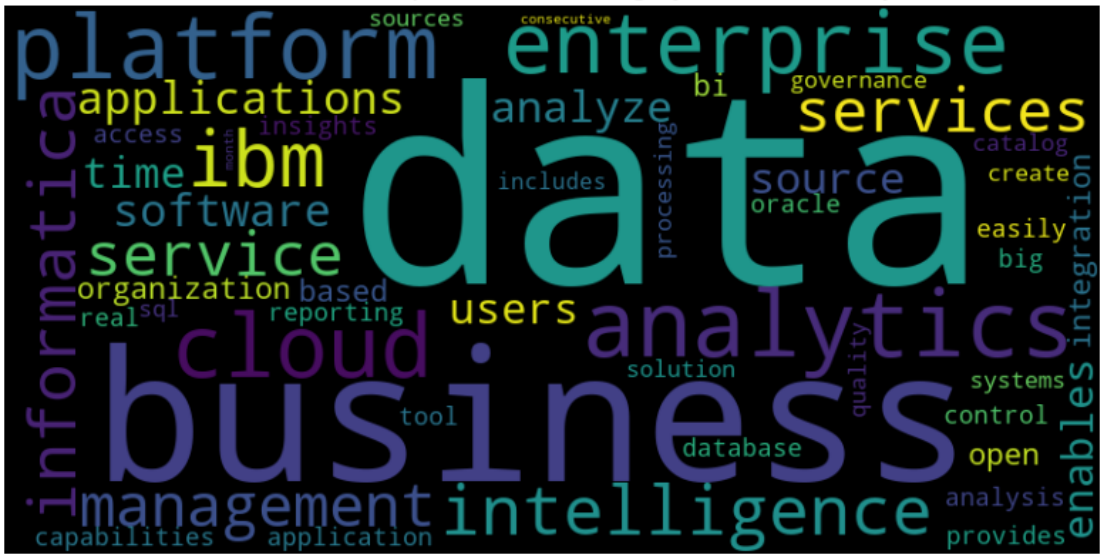
```
Sub-Category: Device Management
Top 10 unique words: ['access' 'cloud' 'device' 'devices' 'management'
'platform' 'remote'
 'response' 'software' 'support']

Sub-Category: Supply Chain Management (SCM)
Top 10 unique words: ['chain' 'contract' 'data' 'management' 'mobile' 'provides'
'service'
 'software' 'solution' 'supply']

Sub-Category: Human Resources Management (HRM)
Top 10 unique words: ['based' 'business' 'employee' 'enterprise' 'learning'
'management'
 'platform' 'solution' 'training' 'workforce']

Sub-Category: Enterprise Resource Planning (ERP)
Top 10 unique words: ['applications' 'business' 'cloud' 'data' 'enterprise'
'erp' 'management'
 'sap' 'services' 'software']

Sub-Category: Finance
Top 10 unique words: ['data' 'end' 'financial' 'management' 'process' 'sales'
'sap' 'software'
 'solutions' 'tax']

Sub-Category: Enterprise Architecture Management (EAM)
Top 10 unique words: ['architecture' 'artifacts' 'capture' 'data' 'ea'
'enterprise' 'help'
 'models' 'shape' 'tools']

Sub-Category: Field / Dispatch Services Management (FDSM)
Top 10 unique words: ['application' 'calendly' 'capabilities' 'inventory'
'items' 'provides'
 'tags' 'tasks' 'time' 'track']
```

In this process, we use TF-IDF (Term Frequency-Inverse Document Frequency) to identify the most unique and distinctive words for each category and sub-category in the dataset. TF-IDF assigns higher scores to words that appear frequently in a specific category but less frequently across all categories, helping to highlight words that are more representative of each group. We apply the TfidfVectorizer to the product descriptions of each category and sub-category to extract the top 10 unique words that are more tailored toward their respective groups. This analysis helps us understand which words are more specific to a particular category or sub-category, differentiating the products across the dataset. The result is a list of the most important and distinctive terms for each group, which can later assist in building a classification model.

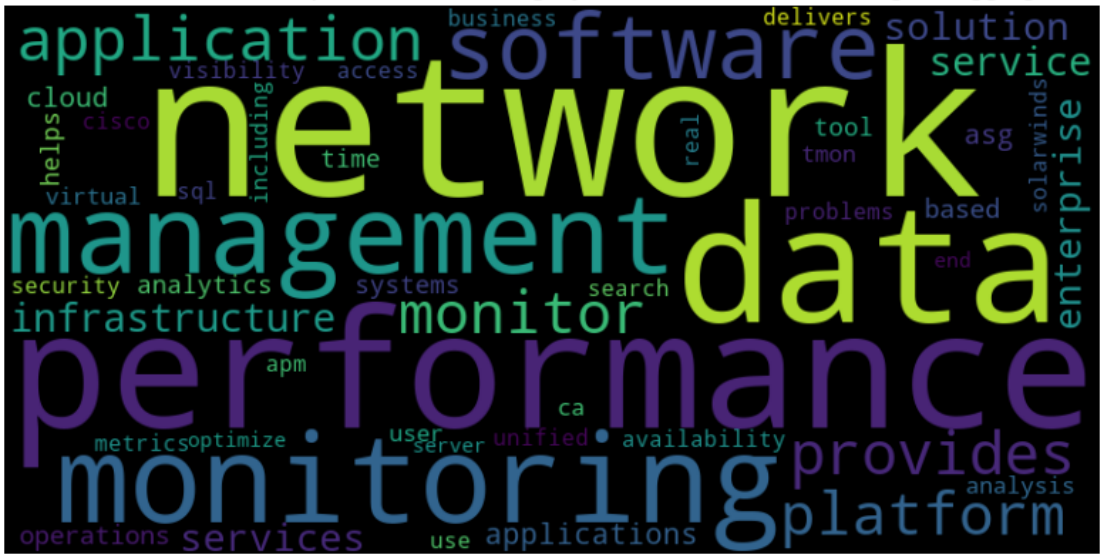
[56]:
```
from sklearn.feature_extraction.text import TfidfVectorizer
from wordcloud import WordCloud
import matplotlib.pyplot as plt
```

```python
# Function to get top n unique words using TF-IDF and their corresponding␣
↪TF-IDF scores
def get_top_tfidf_words_with_scores(corpus, n=50):
    tfidf_vectorizer = TfidfVectorizer(stop_words='english', max_features=n)
    tfidf_matrix = tfidf_vectorizer.fit_transform(corpus)
    feature_names = tfidf_vectorizer.get_feature_names_out()
    tfidf_scores = tfidf_matrix.toarray().sum(axis=0)
    return dict(zip(feature_names, tfidf_scores))

# Function to generate a word cloud
def generate_wordcloud_from_tfidf(tfidf_dict, title):
    wordcloud = WordCloud(width=800, height=400, background_color='black').
↪generate_from_frequencies(tfidf_dict)
    plt.figure(figsize=(10, 5))
    plt.imshow(wordcloud, interpolation='bilinear')
    plt.axis('off')
    plt.title(title, fontsize=14)
    plt.show()

# Generate Word Cloud for Each Category using top unique words from TF-IDF
for category in merged_df['taxonomy_category'].unique():
    category_data = merged_df[merged_df['taxonomy_category'] ==␣
↪category]['product_description'].dropna()
    tfidf_dict = get_top_tfidf_words_with_scores(category_data, 50)  # Top 50␣
↪unique words
    generate_wordcloud_from_tfidf(tfidf_dict, f'Word Cloud for Unique Words in␣
↪Category: {category}')

# Generate Word Cloud for Each Sub-Category using top unique words from TF-IDF
for sub_category in merged_df['taxonomy_sub_category'].unique():
    sub_category_data = merged_df[merged_df['taxonomy_sub_category'] ==␣
↪sub_category]['product_description'].dropna()
    tfidf_dict = get_top_tfidf_words_with_scores(sub_category_data, 50)  # Top␣
↪50 unique words
    generate_wordcloud_from_tfidf(tfidf_dict, f'Word Cloud for Unique Words in␣
↪Sub-Category: {sub_category}')
```

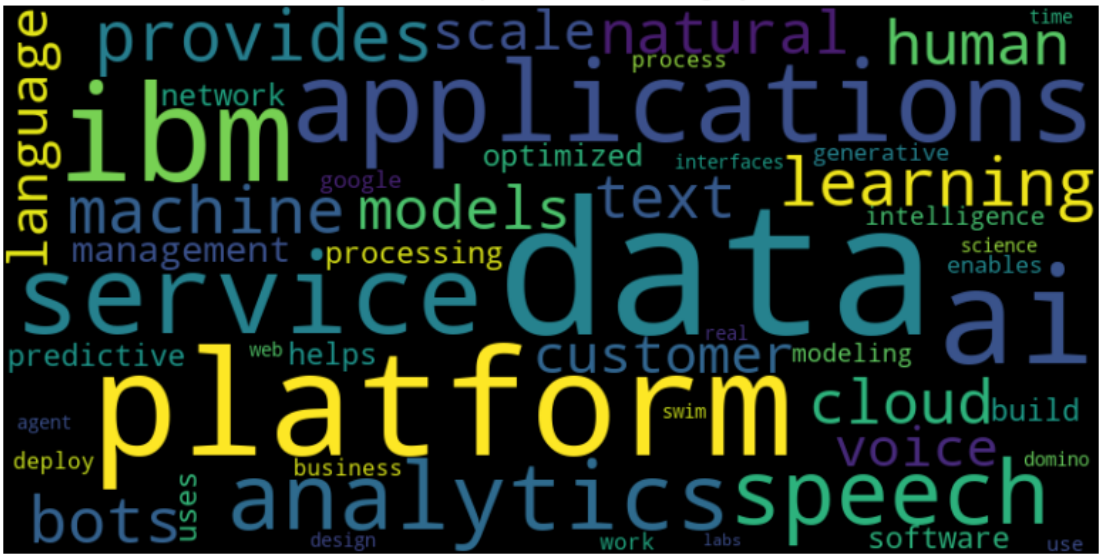
Word Cloud for Unique Words in Category: BI & Data Analytics




Word Cloud for Unique Words in Category: Performance, Monitoring & Logging

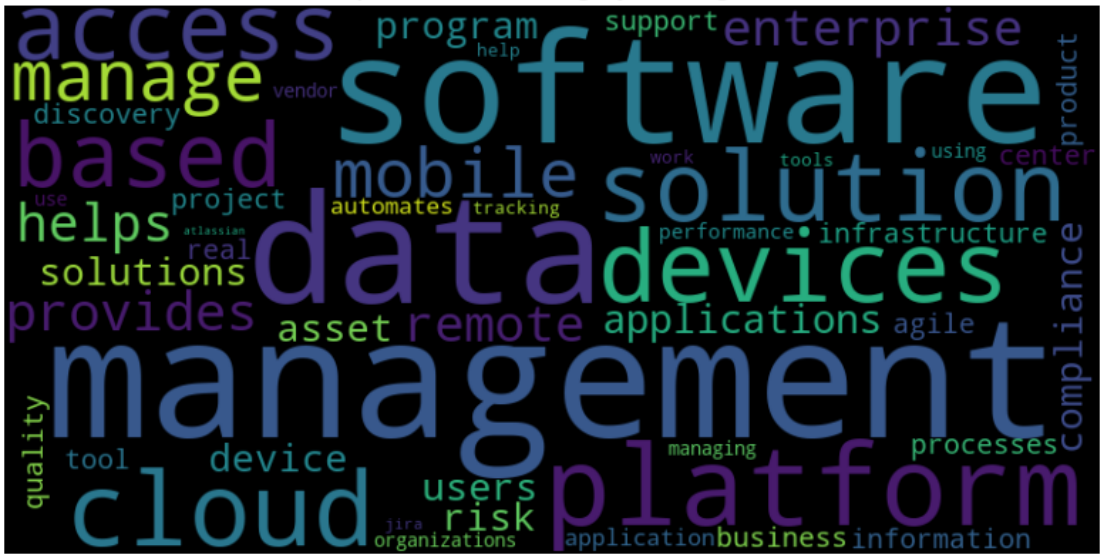


Word Cloud for Unique Words in Category: AI & ML

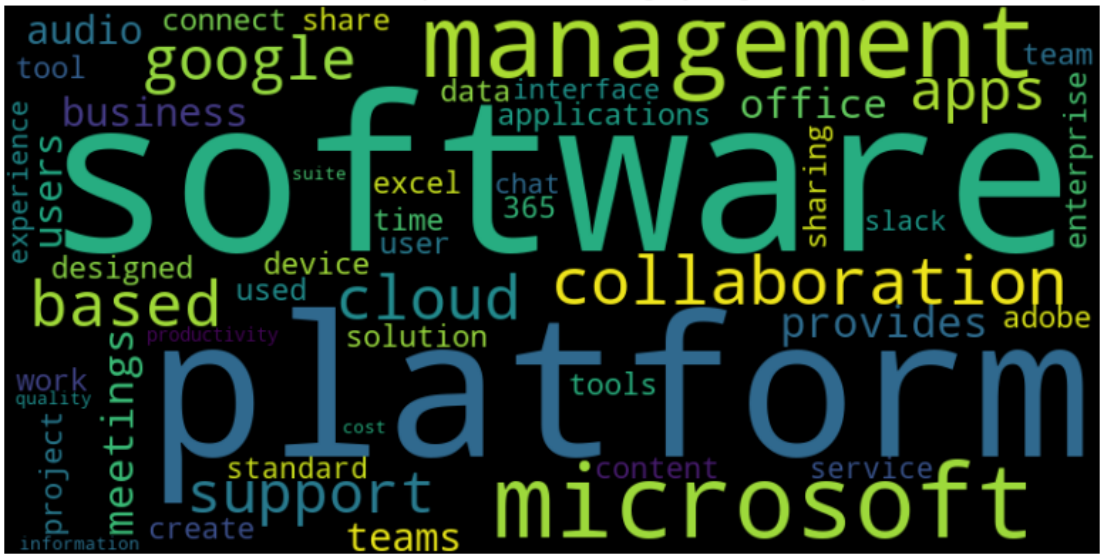



Word Cloud for Unique Words in Category: Geographic Information Systems (GIS)

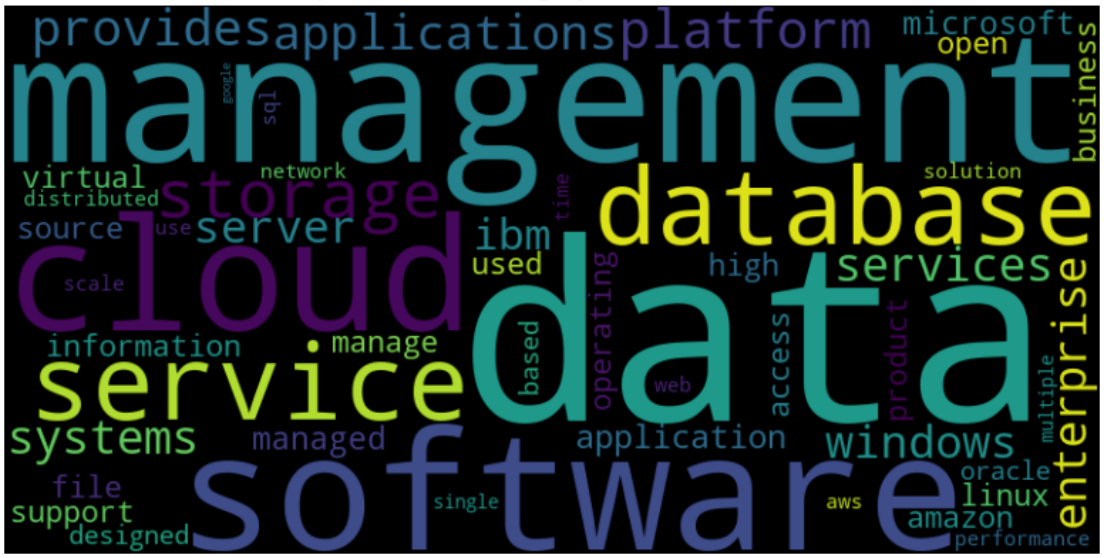
Word Cloud for Unique Words in Category: Management & Governance



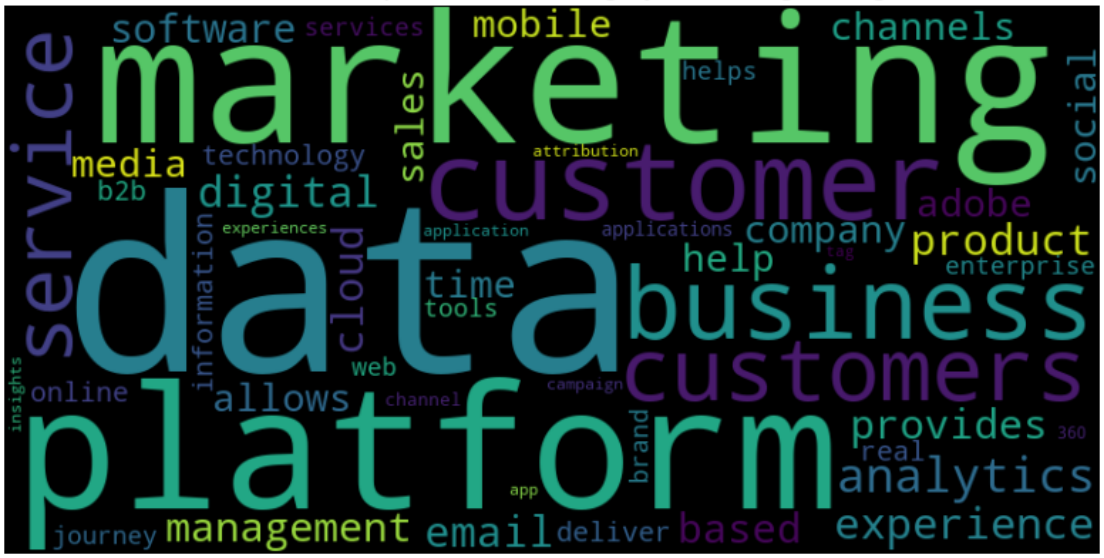

Word Cloud for Unique Words in Category: Digital Workplace



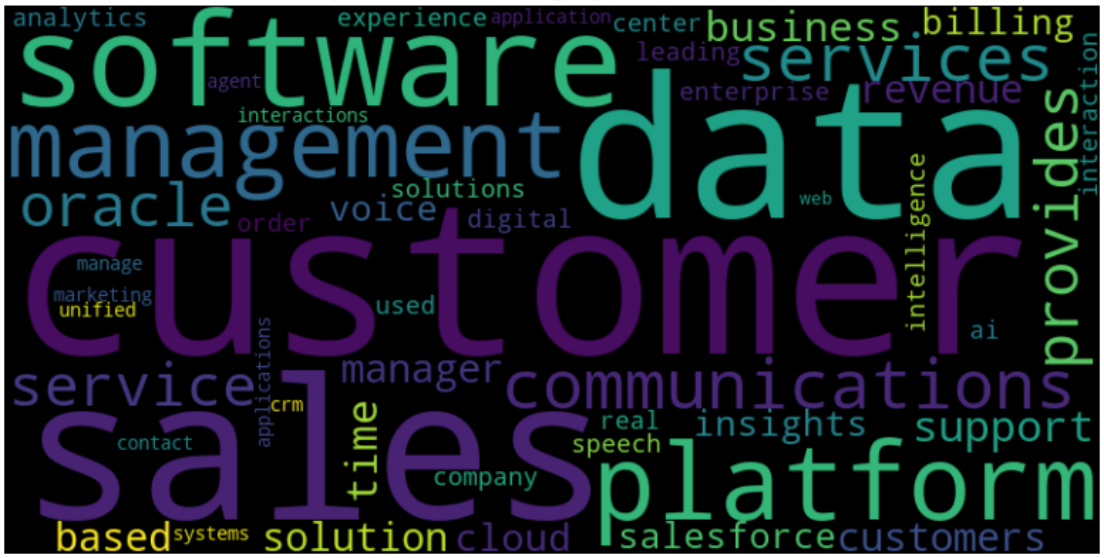
Word Cloud for Unique Words in Category: IT Infrastructure Software Services




Word Cloud for Unique Words in Category: Marketing Management

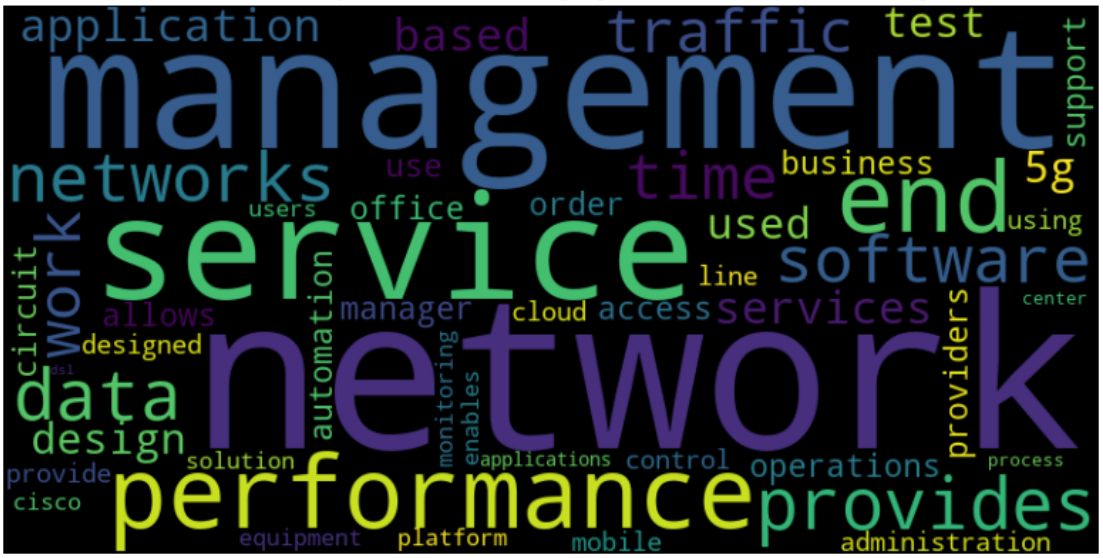


Word Cloud for Unique Words in Category: Customer Operational Platforms




Word Cloud for Unique Words in Category: Enterprise Platforms

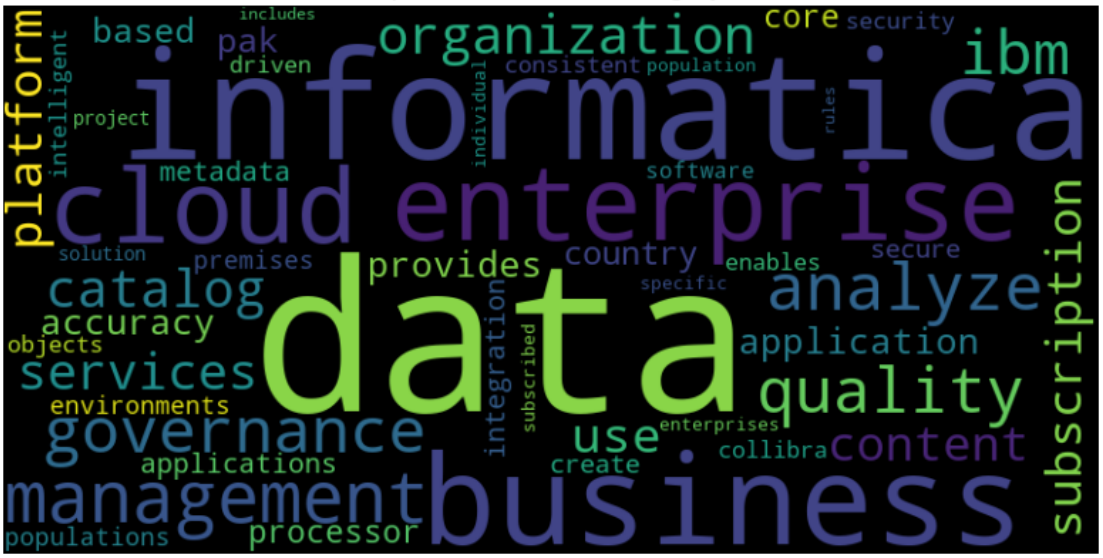
Word Cloud for Unique Words in Category: Telecom Network Management



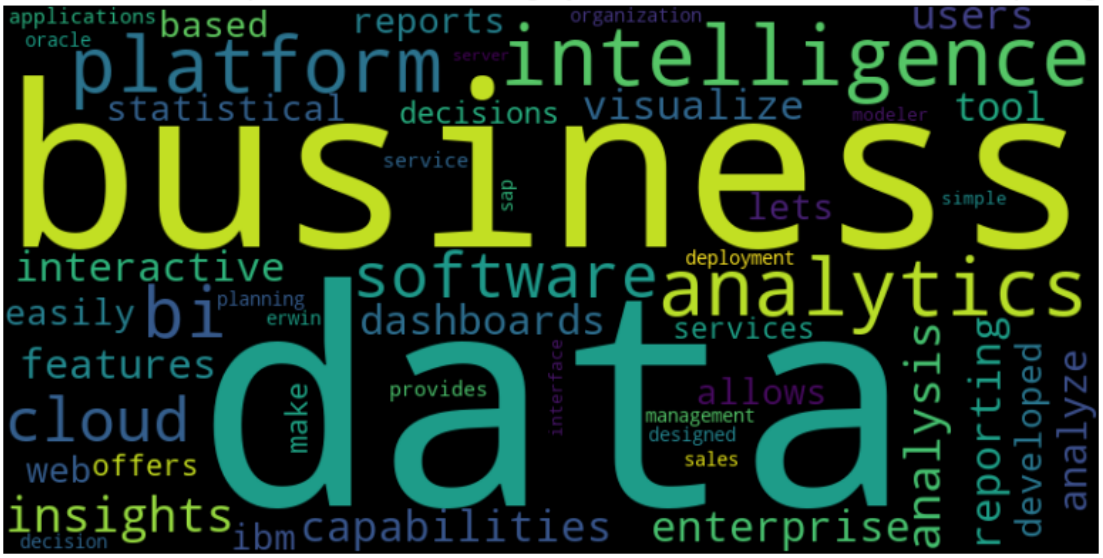

Word Cloud for Unique Words in Category: Emerging Technologies

Word Cloud for Unique Words in Category: Design, Development & Delivery

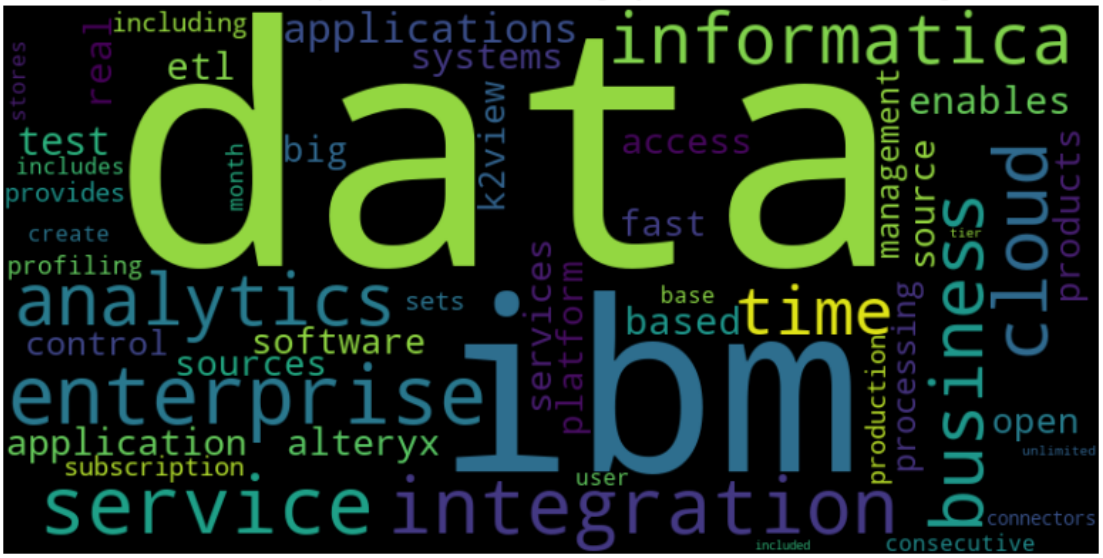
Word Cloud for Unique Words in Sub-Category: Data Governance



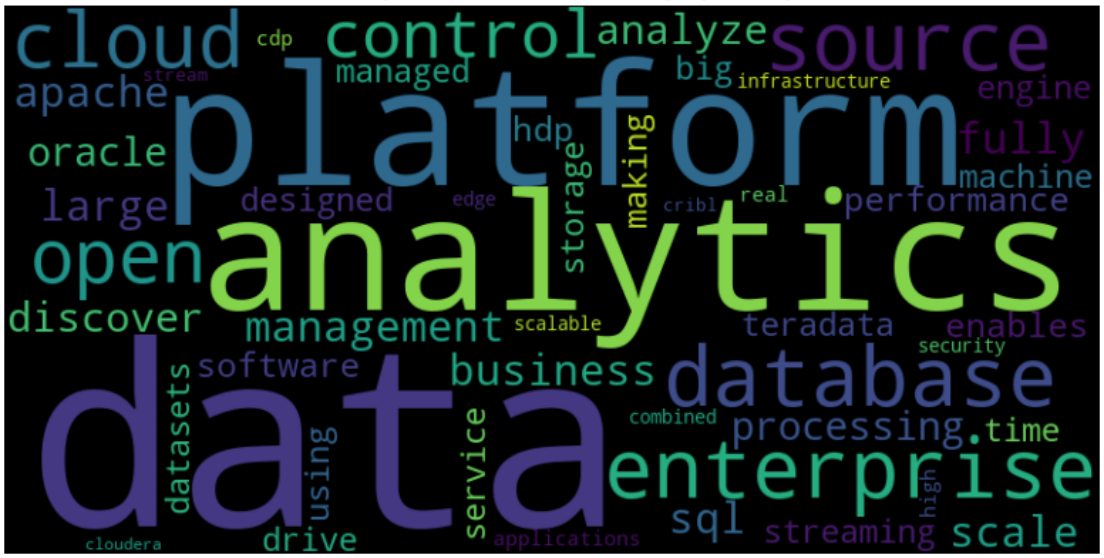
Word Cloud for Unique Words in Sub-Category: Self-Serve Visualization & Ent. Reporting



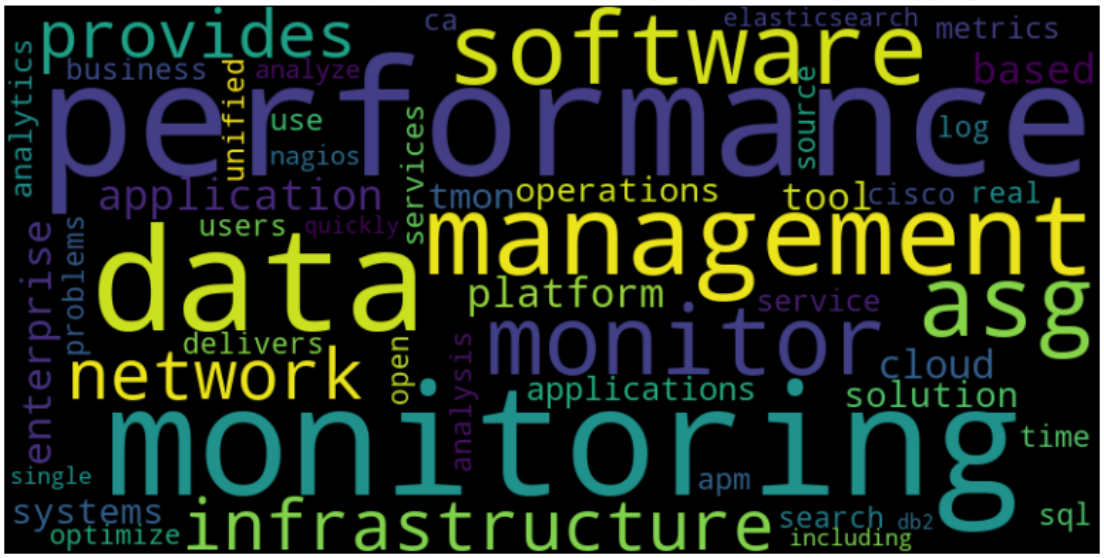

Word Cloud for Unique Words in Sub-Category: Data Movement Management



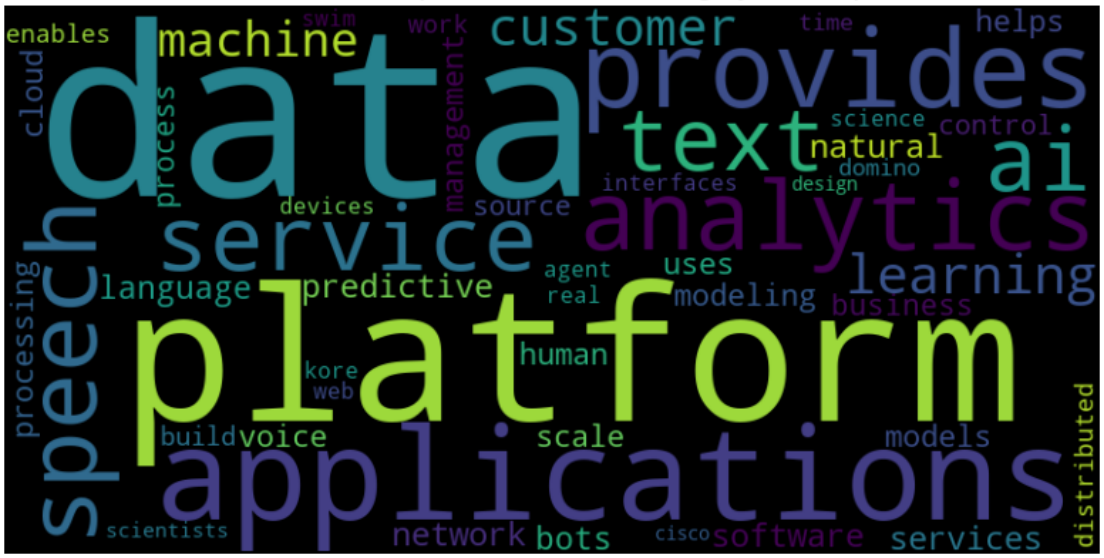
Word Cloud for Unique Words in Sub-Category: Analytics Database



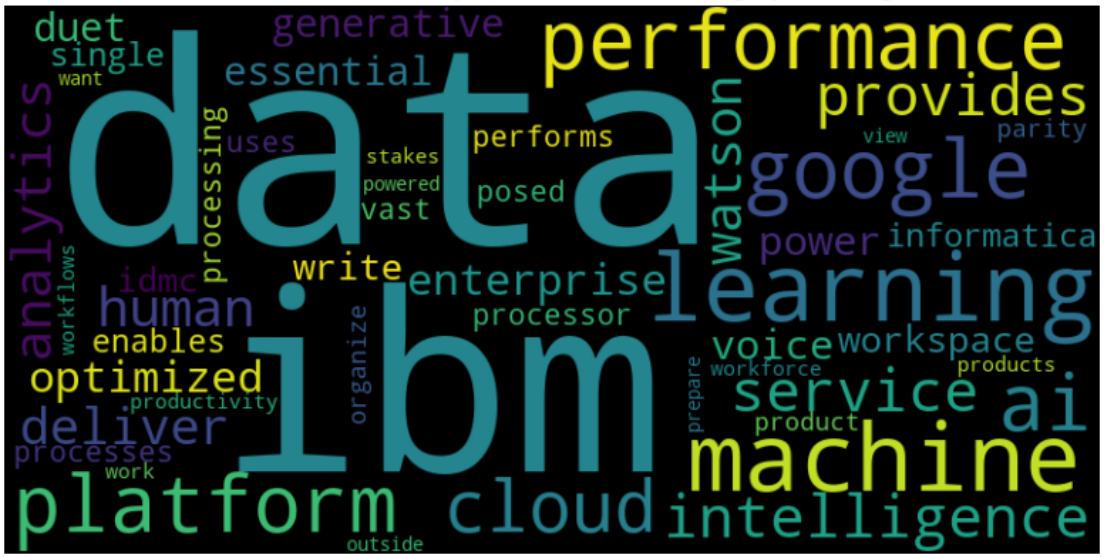

Word Cloud for Unique Words in Sub-Category: Monitoring & Logging



Word Cloud for Unique Words in Sub-Category: Development




Word Cloud for Unique Words in Sub-Category: Serving

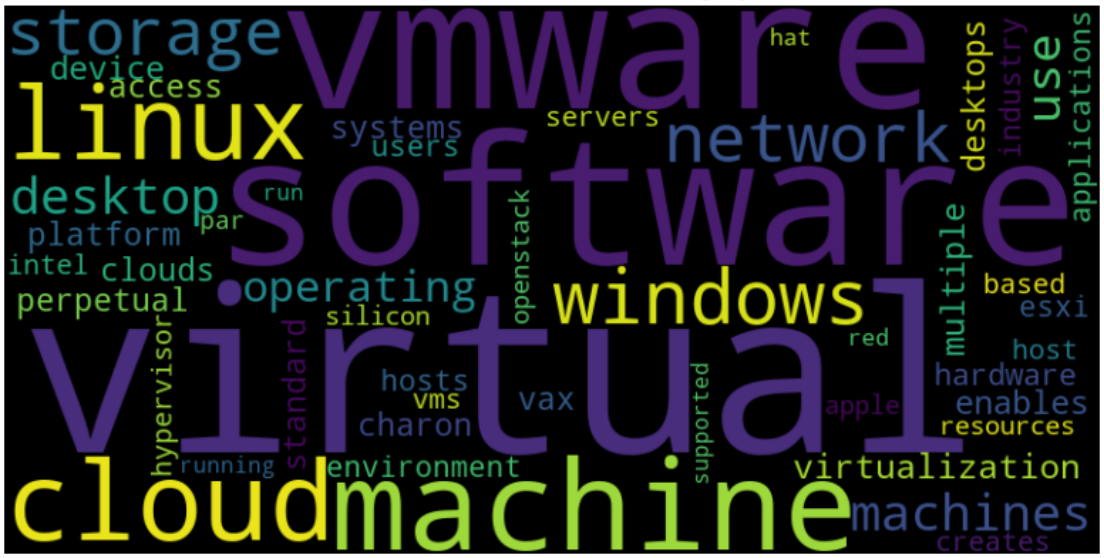


Word Cloud for Unique Words in Sub-Category: Location-Aware Services

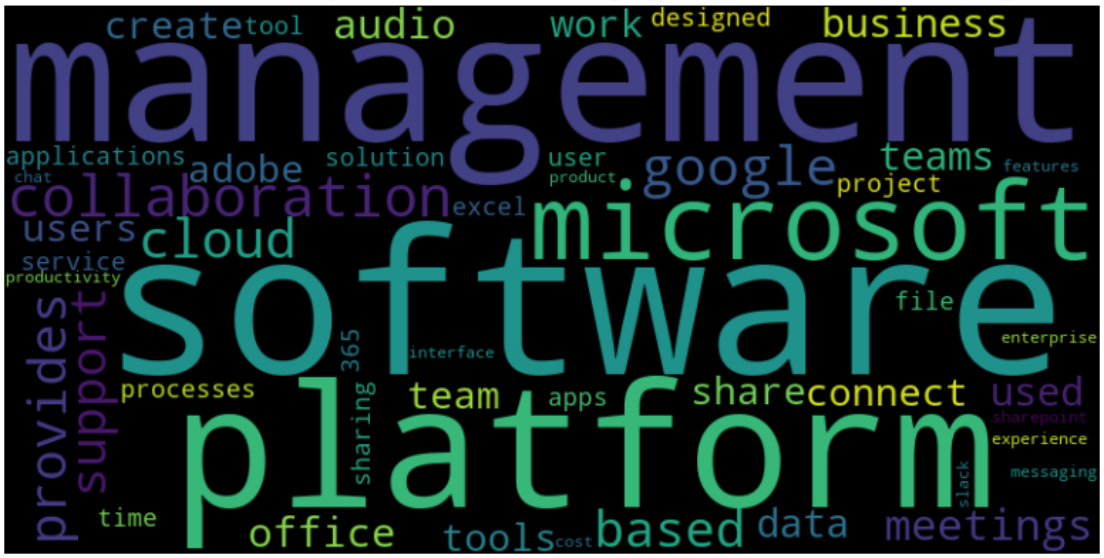
Word Cloud for Unique Words in Sub-Category: Risk & Compliance

Word Cloud for Unique Words in Sub-Category: End-User Compute

Word Cloud for Unique Words in Sub-Category: Virtualization



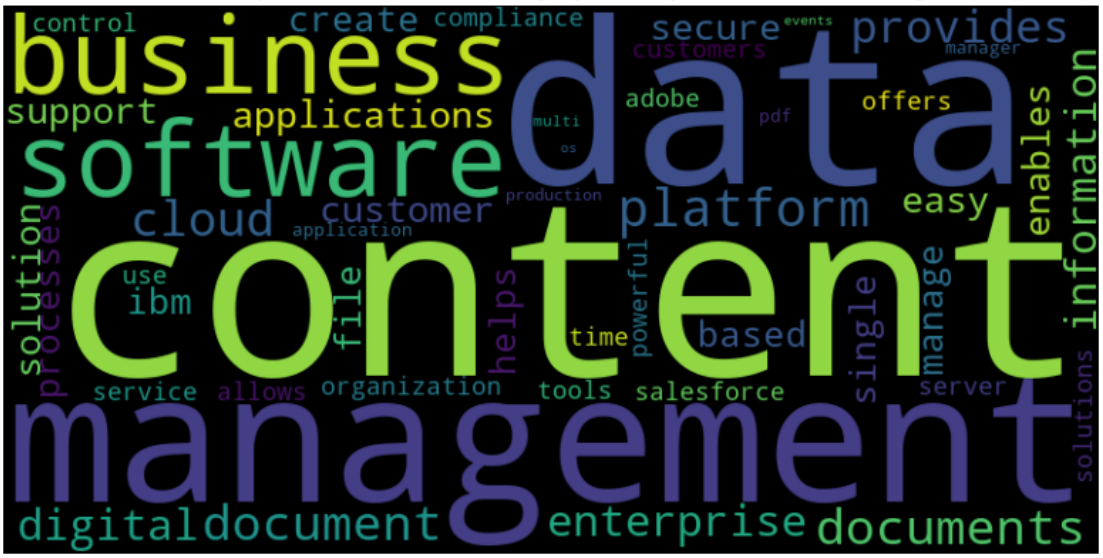
Word Cloud for Unique Words in Sub-Category: Collaboration & Productivity




Word Cloud for Unique Words in Sub-Category: Market Intelligence

Word Cloud for Unique Words in Sub-Category: Customer Experience

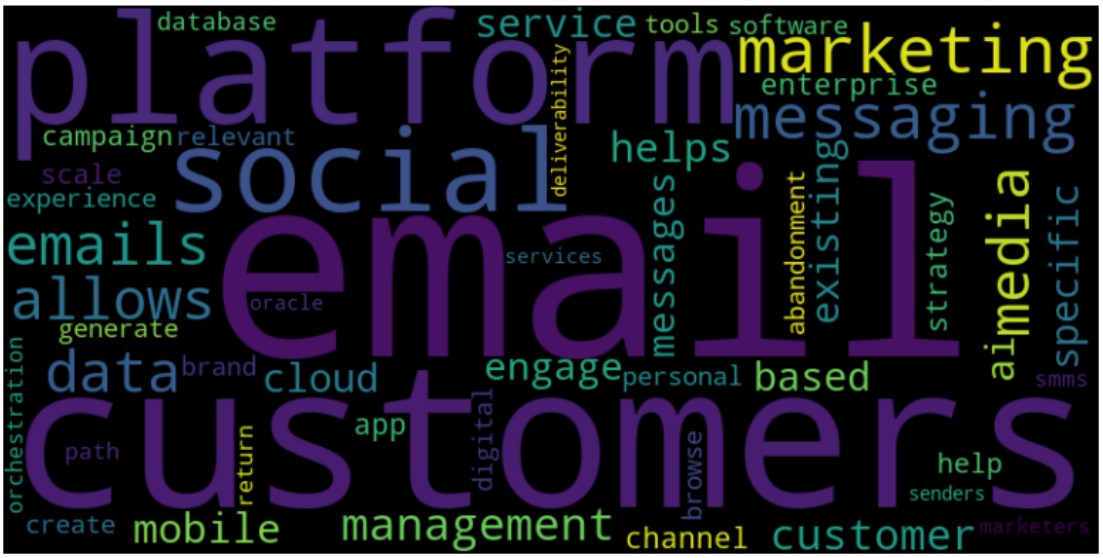
Word Cloud for Unique Words in Sub-Category: Enterprise Content Management (ECM)



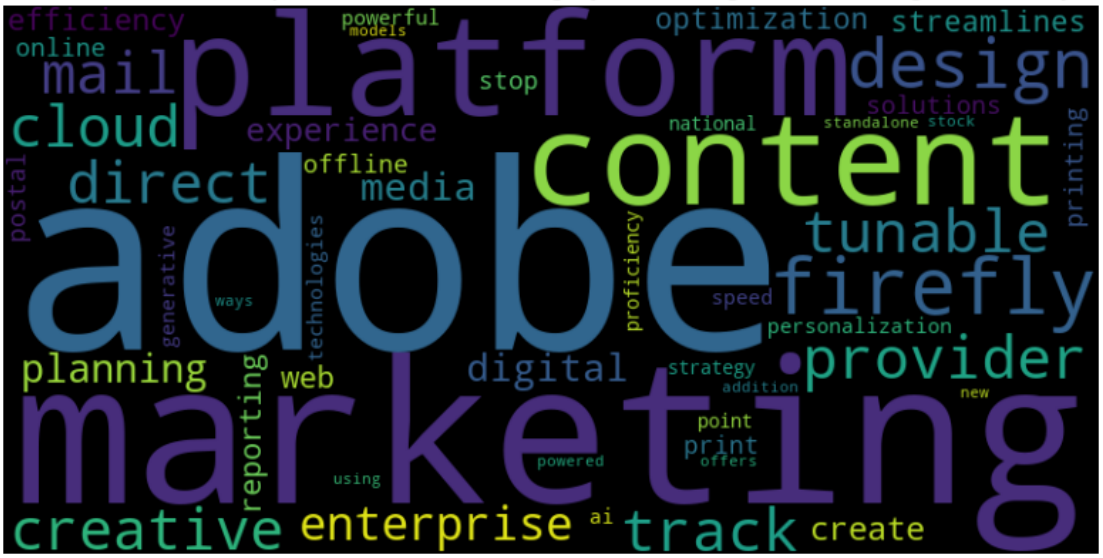
Word Cloud for Unique Words in Sub-Category: Sales Mgmt

Word Cloud for Unique Words in Sub-Category: Marketing Automation

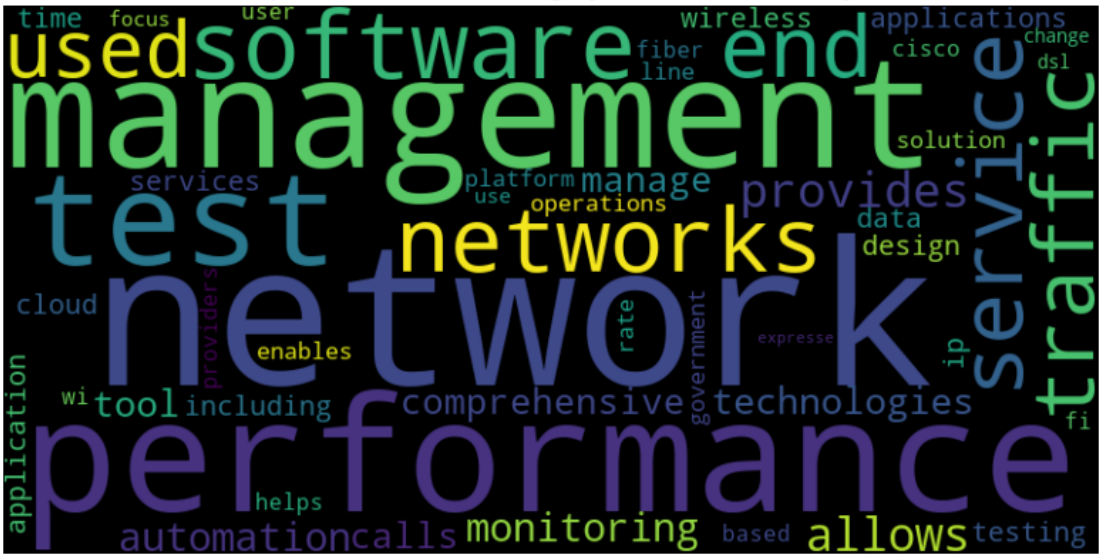
Word Cloud for Unique Words in Sub-Category: Messaging/Communication Systems



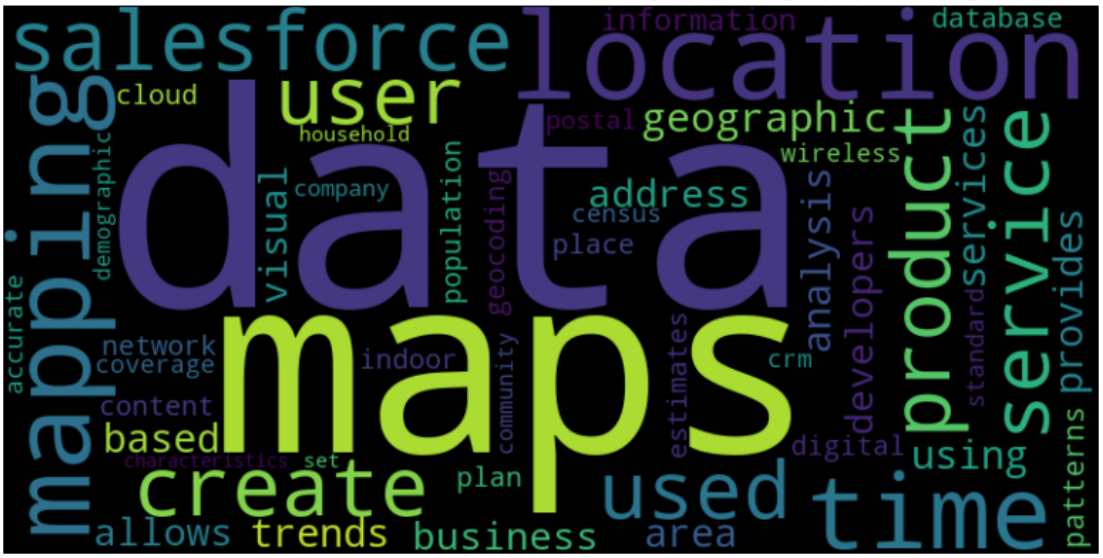

Word Cloud for Unique Words in Sub-Category: Marketing Content Design & Delivery



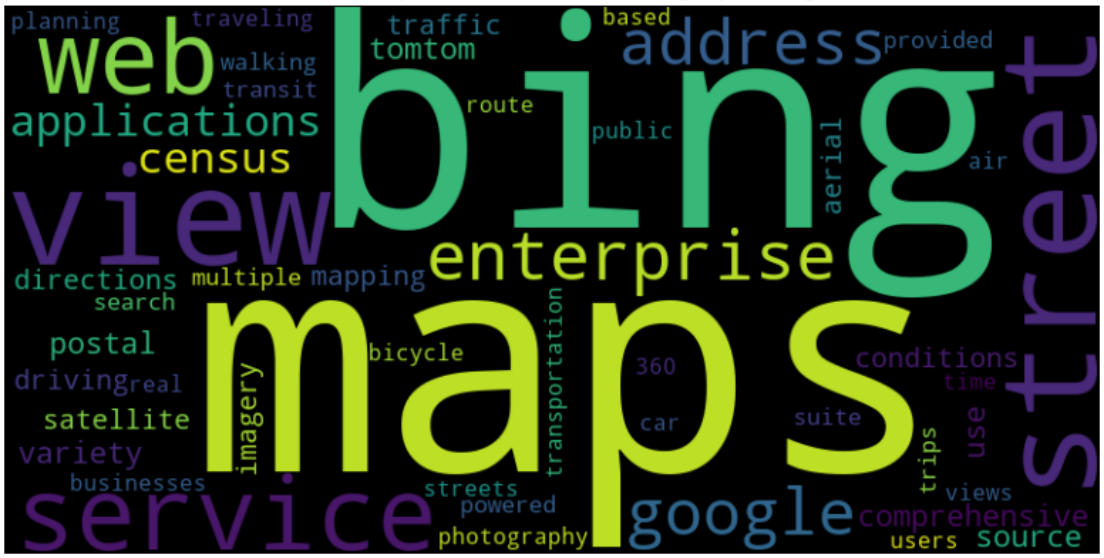
Word Cloud for Unique Words in Sub-Category: Network Availability and Performance



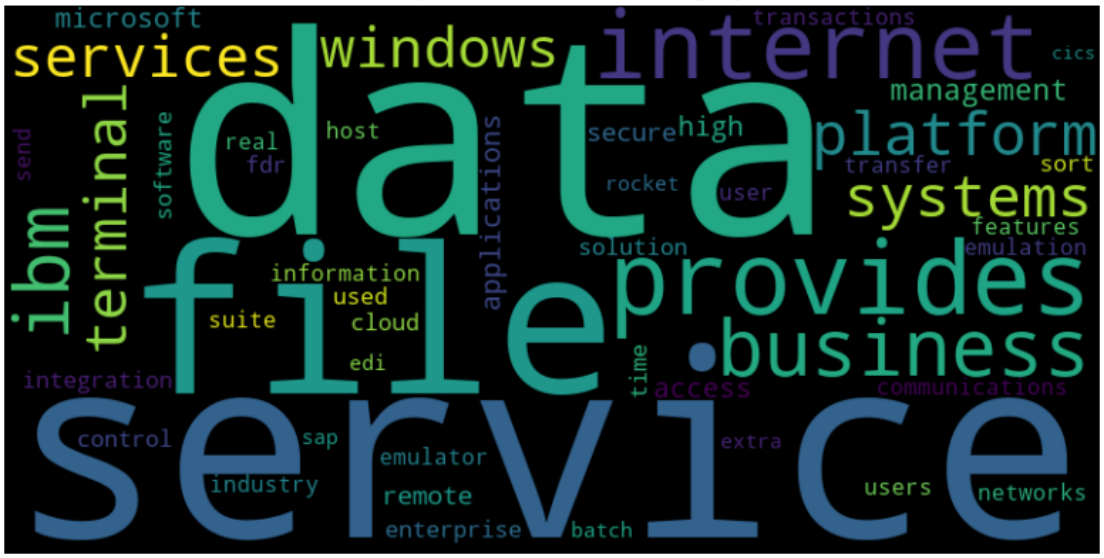

Word Cloud for Unique Words in Sub-Category: Cartography/Mapping



Word Cloud for Unique Words in Sub-Category: Navigation Tools




Word Cloud for Unique Words in Sub-Category: Other Utilities

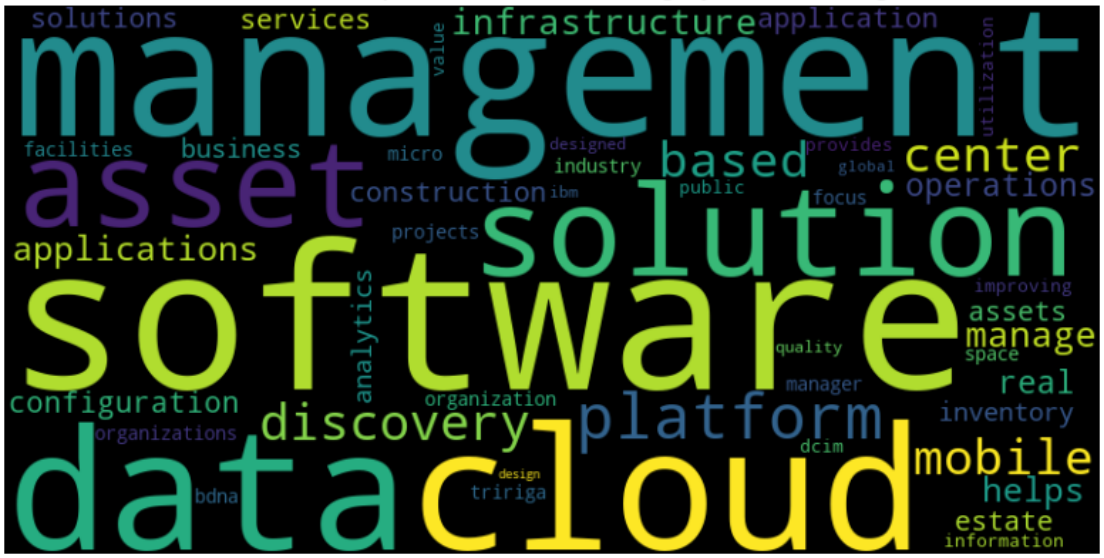


Word Cloud for Unique Words in Sub-Category: Retail & Ecommerce

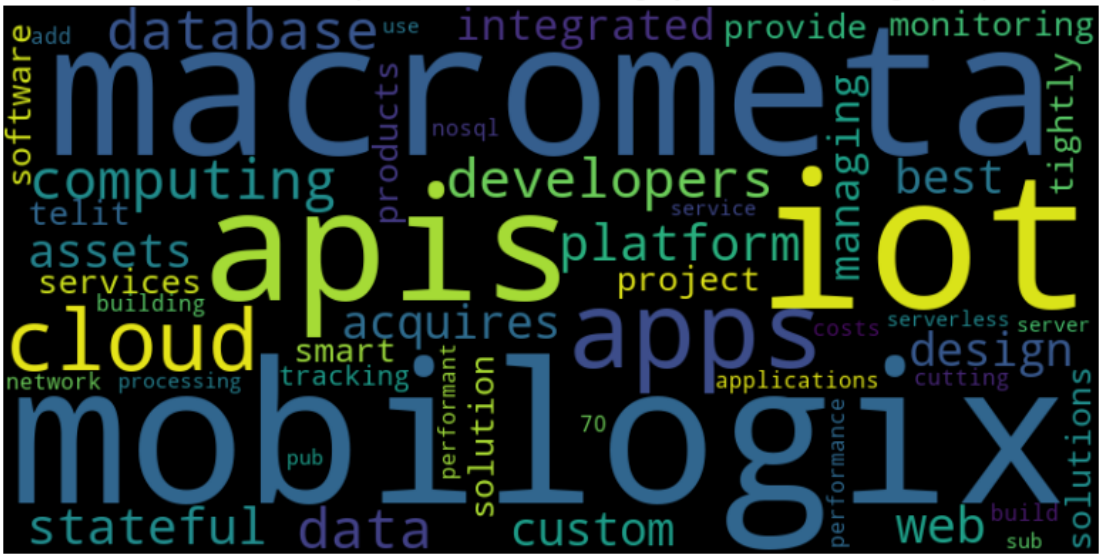
Word Cloud for Unique Words in Sub-Category: Ordering & Billing

Word Cloud for Unique Words in Sub-Category: Application Performance & Resiliency

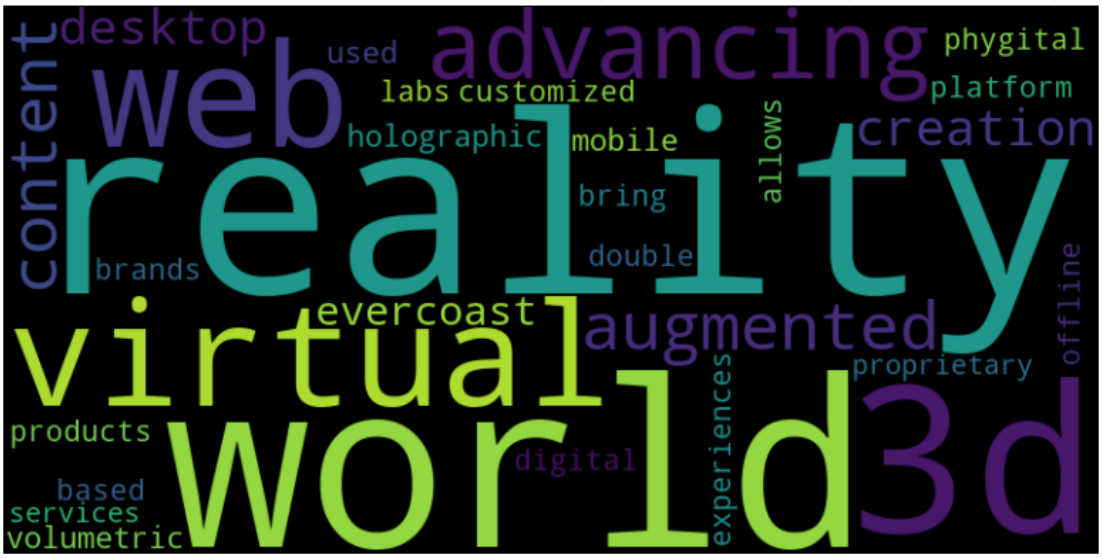
Word Cloud for Unique Words in Sub-Category: Asset Management



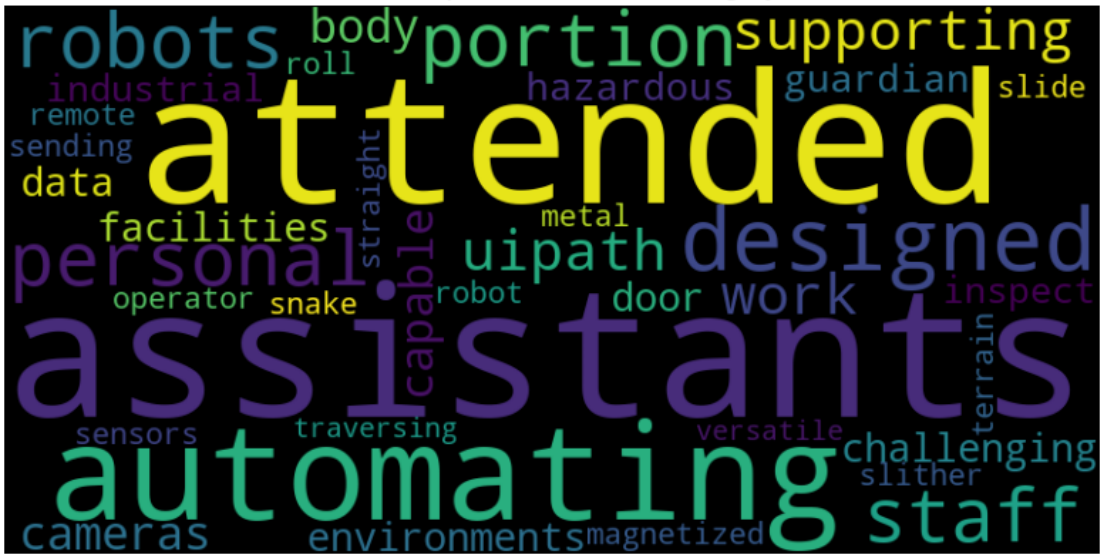
Word Cloud for Unique Words in Sub-Category: Internet of Things (IOT)



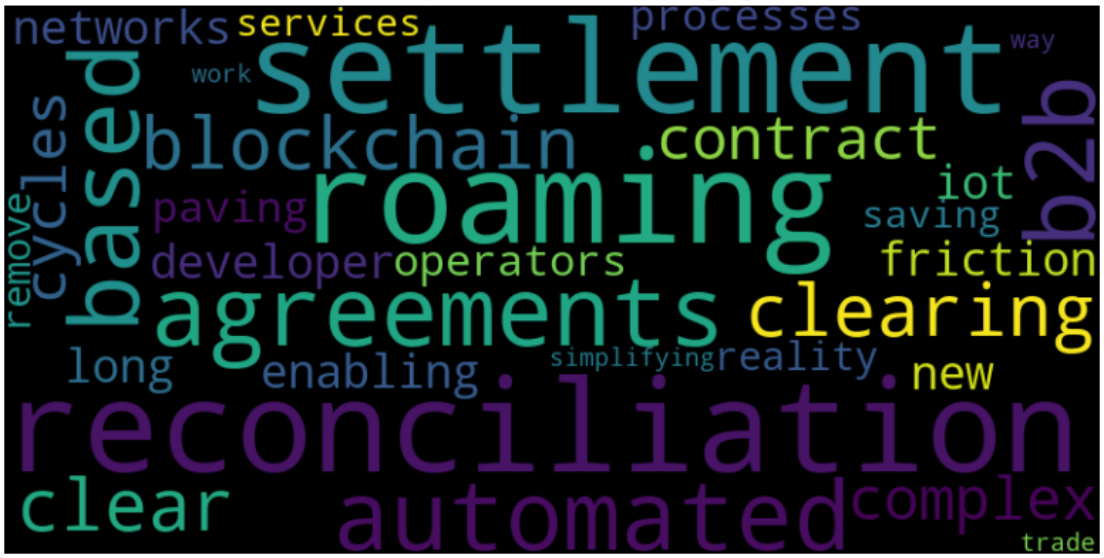

Word Cloud for Unique Words in Sub-Category: Augmented Reality & Virtual Reality



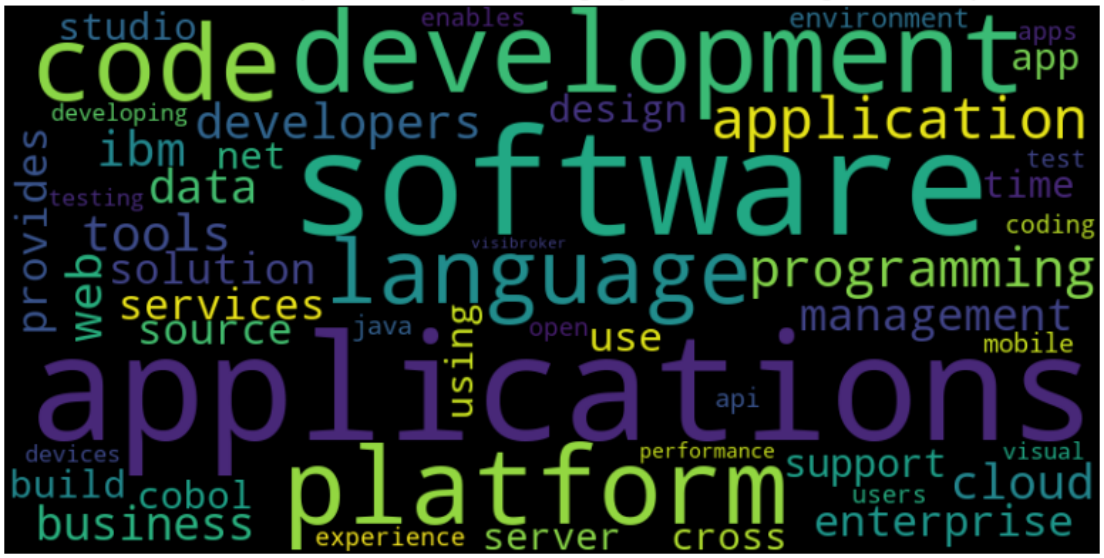
Word Cloud for Unique Words in Sub-Category: Robotics



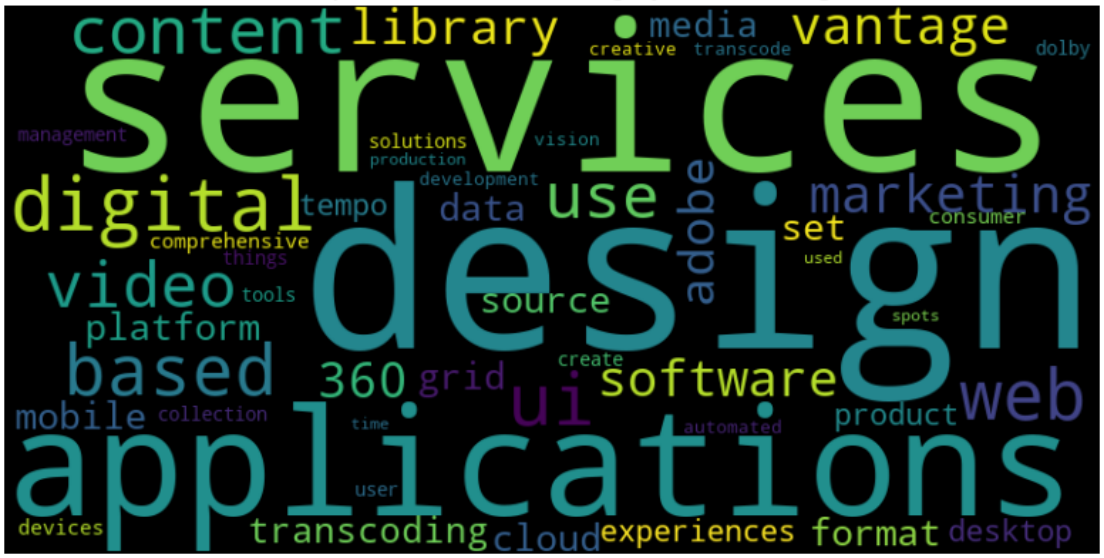

Word Cloud for Unique Words in Sub-Category: Block Chain



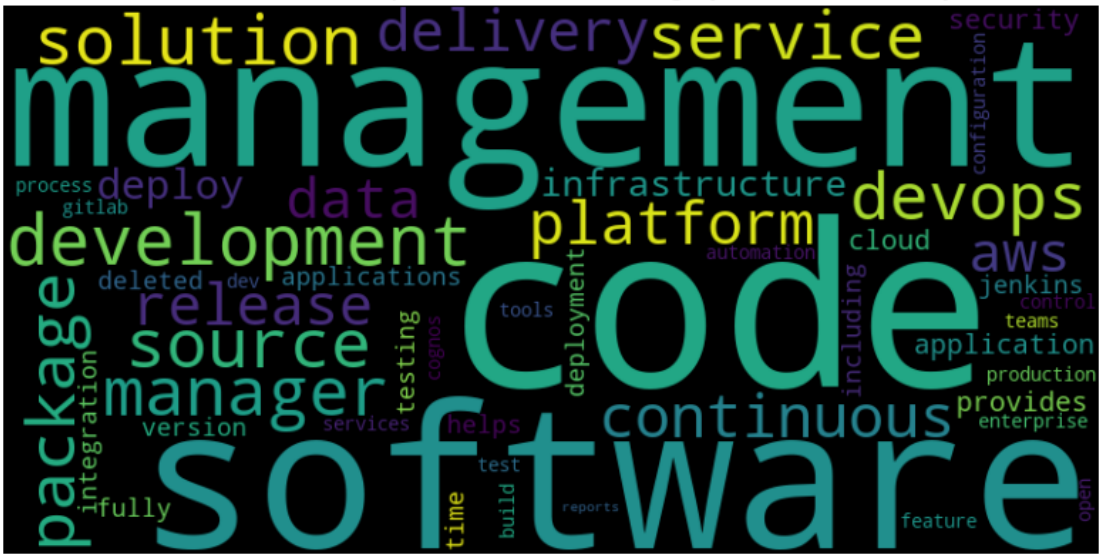
Word Cloud for Unique Words in Sub-Category: Software Design & Development



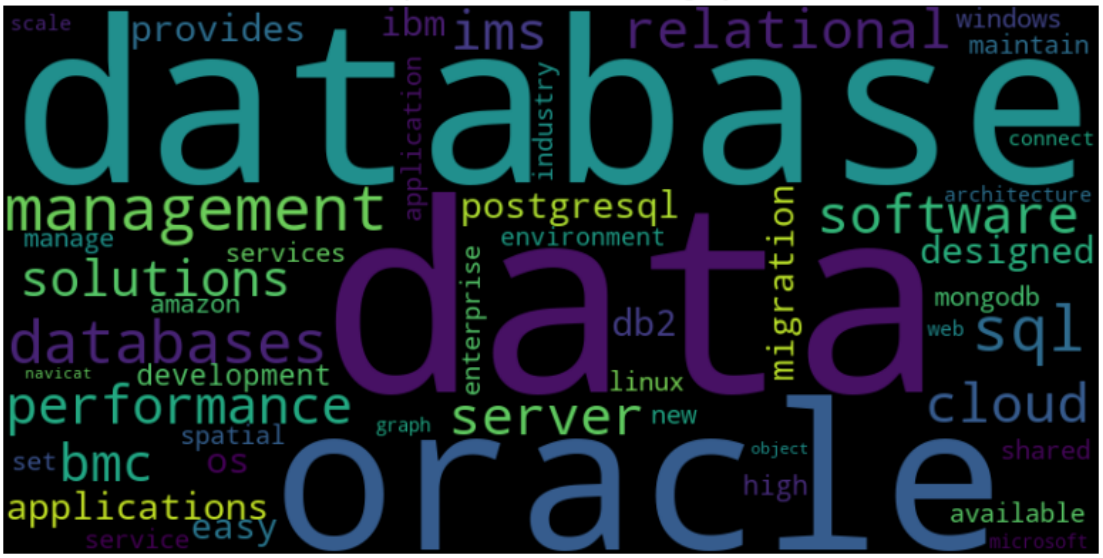

Word Cloud for Unique Words in Sub-Category: UX/UI Design & Multimedia



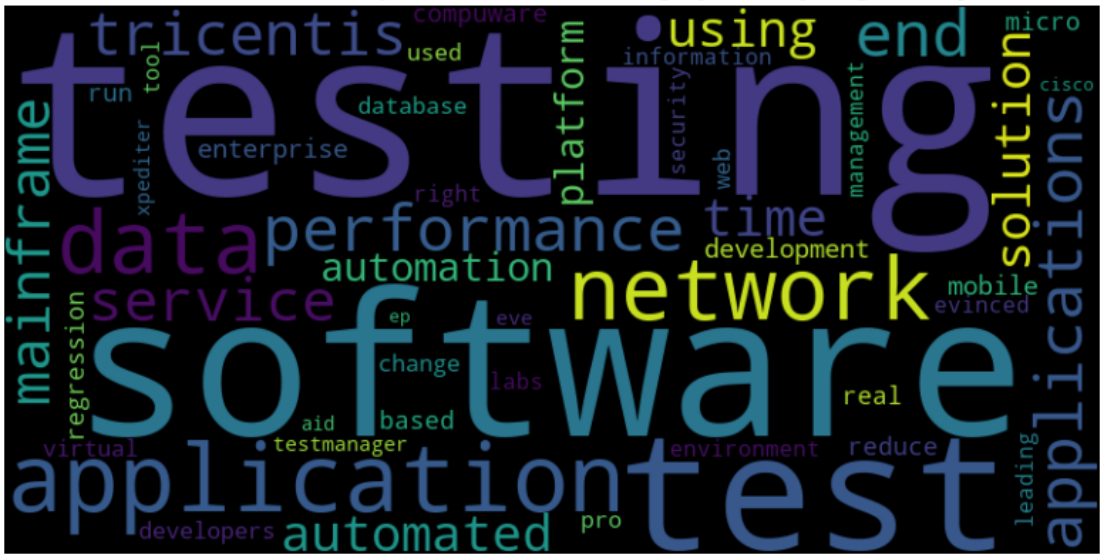
Word Cloud for Unique Words in Sub-Category: Software Delivery




Word Cloud for Unique Words in Sub-Category: Database Tools

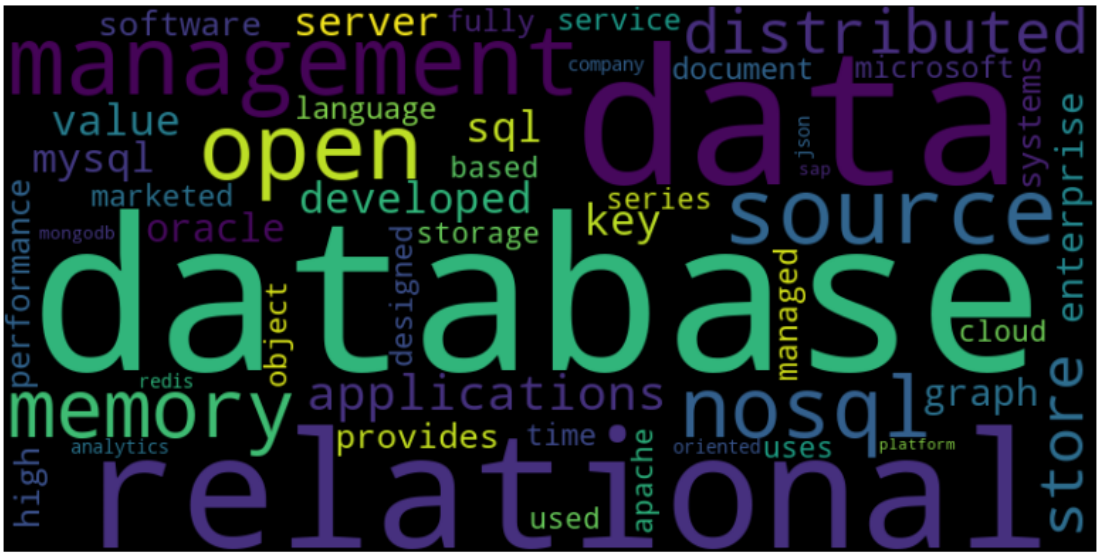


Word Cloud for Unique Words in Sub-Category: Quality Engineering

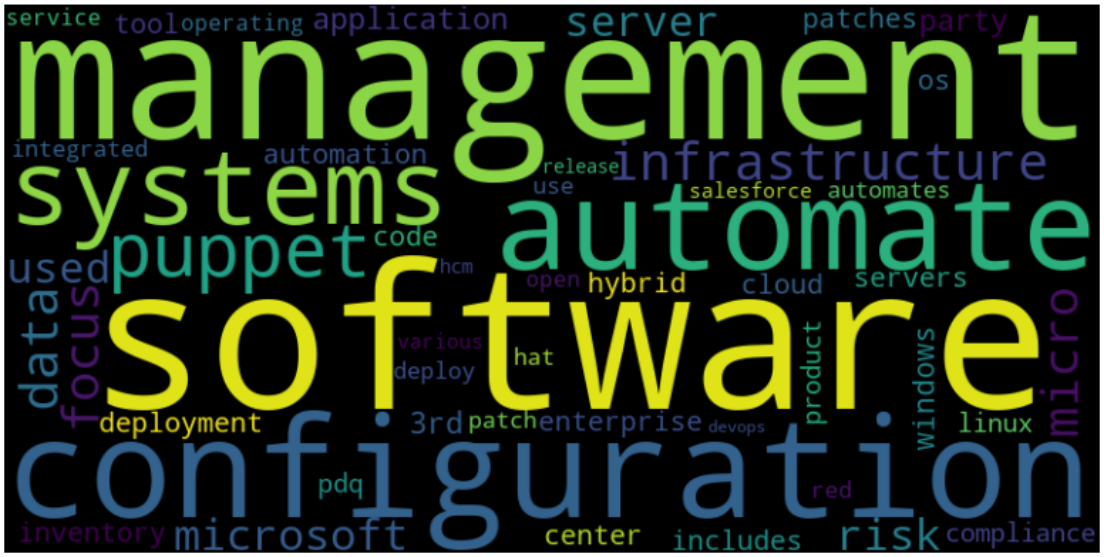



Word Cloud for Unique Words in Sub-Category: Middleware

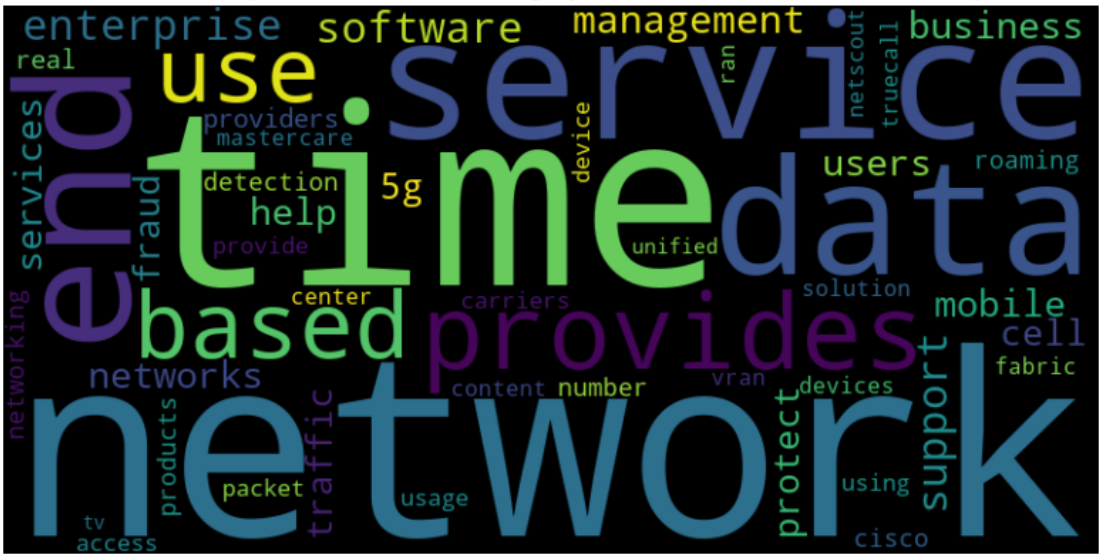
Word Cloud for Unique Words in Sub-Category: Database Management Systems (DBMS)



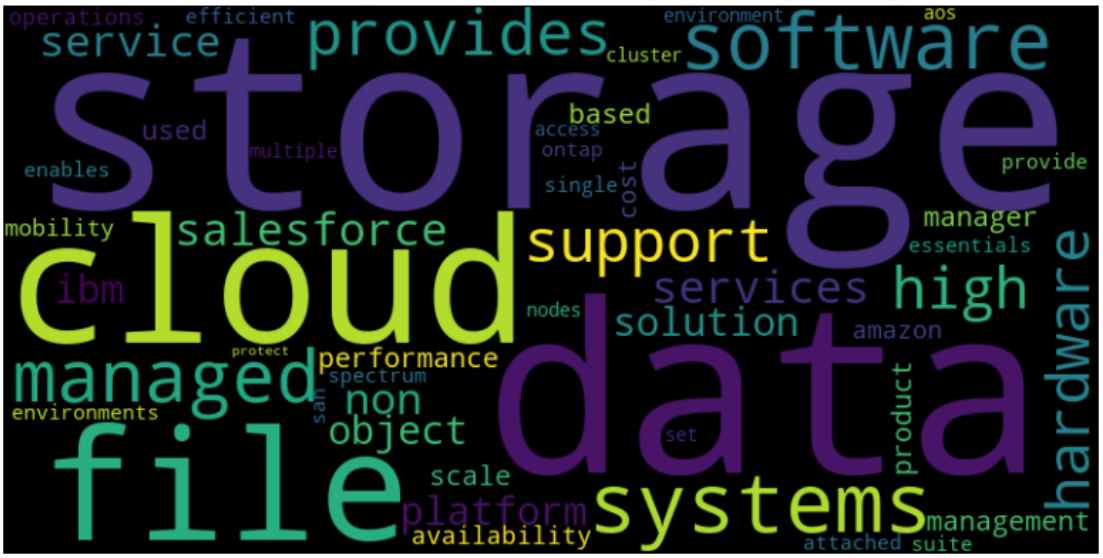

Word Cloud for Unique Words in Sub-Category: Configuration Management



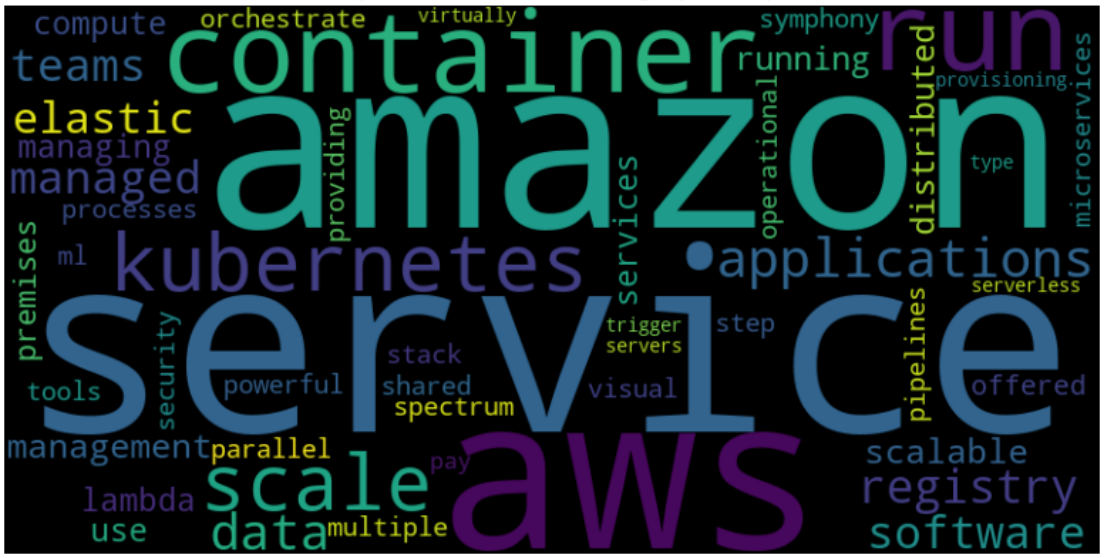
Word Cloud for Unique Words in Sub-Category: Other Network Services and Operational




Word Cloud for Unique Words in Sub-Category: Storage Management

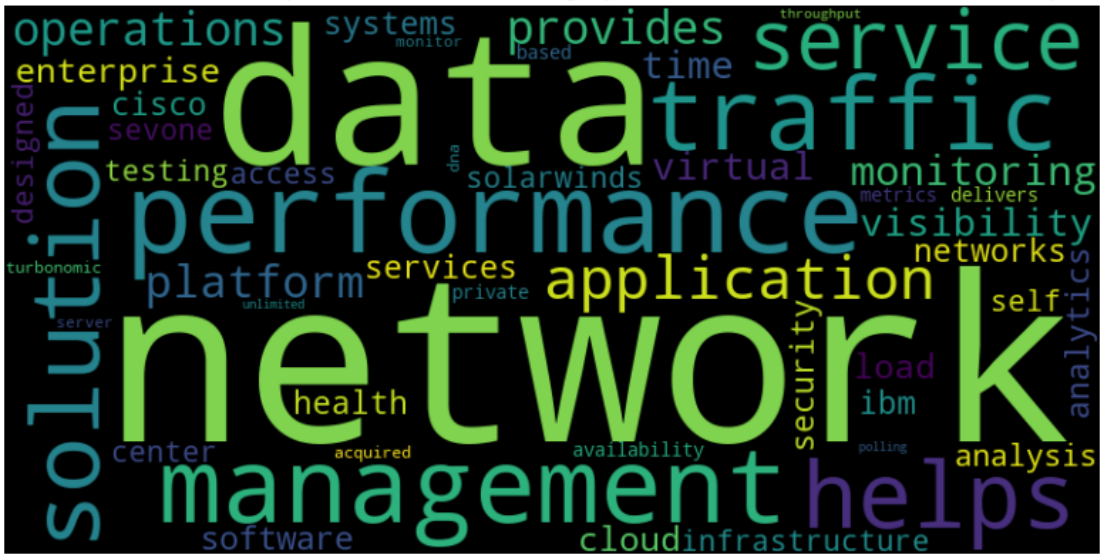


Word Cloud for Unique Words in Sub-Category: Compute & Containers

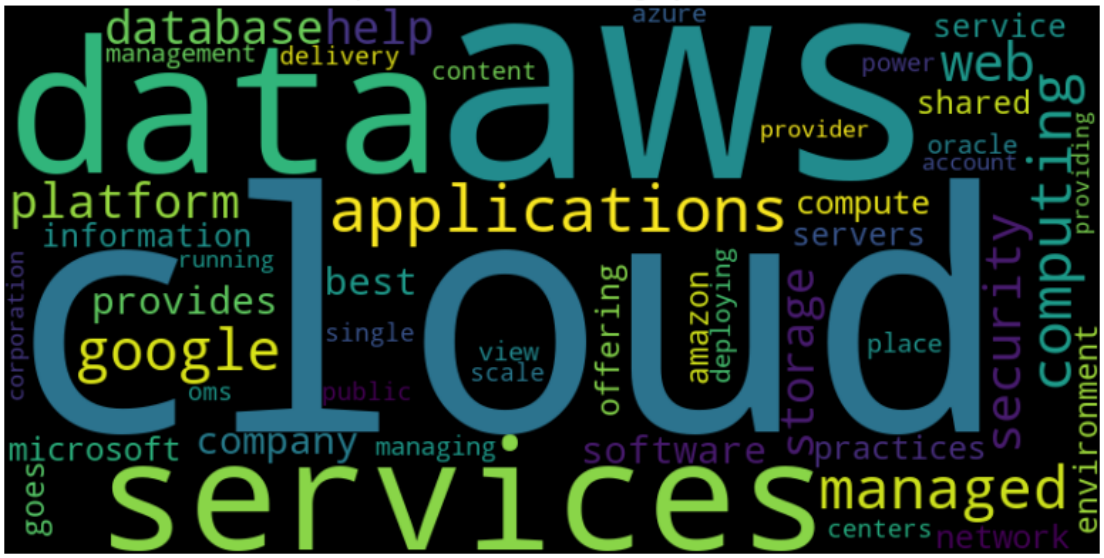



Word Cloud for Unique Words in Sub-Category: Application Development Lifecycle Management (ADLM)

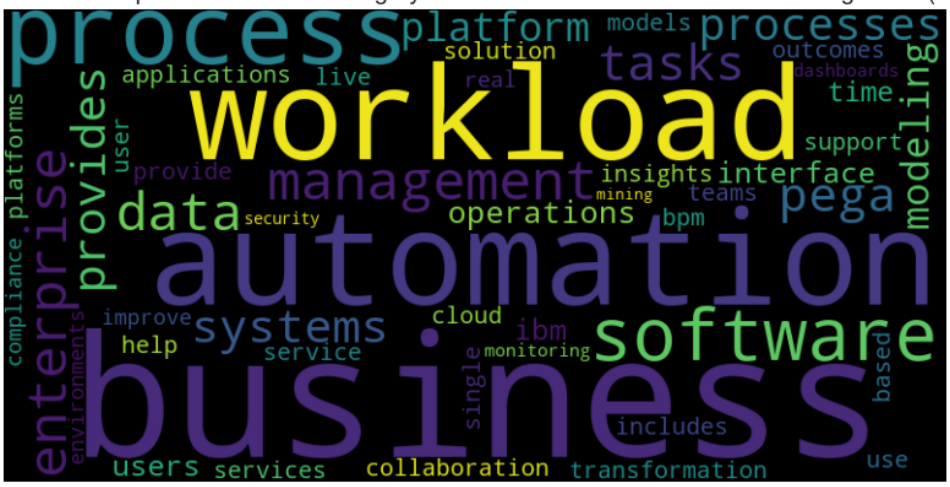
Word Cloud for Unique Words in Sub-Category: Network Performance & Resiliency



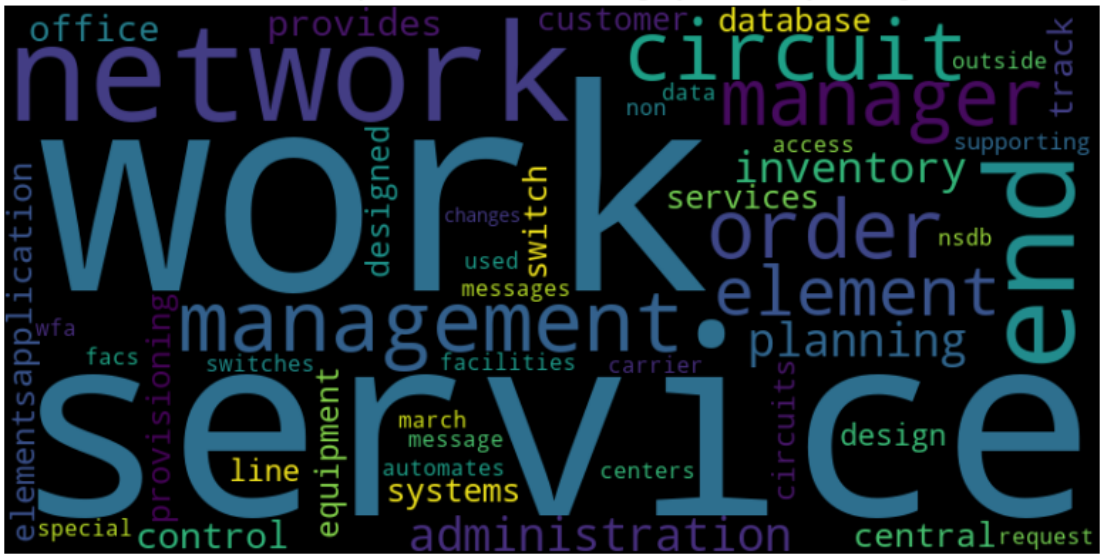

Word Cloud for Unique Words in Sub-Category: Generic Cloud Services



Word Cloud for Unique Words in Sub-Category: Workflow and Business Process Management (W-BPM)

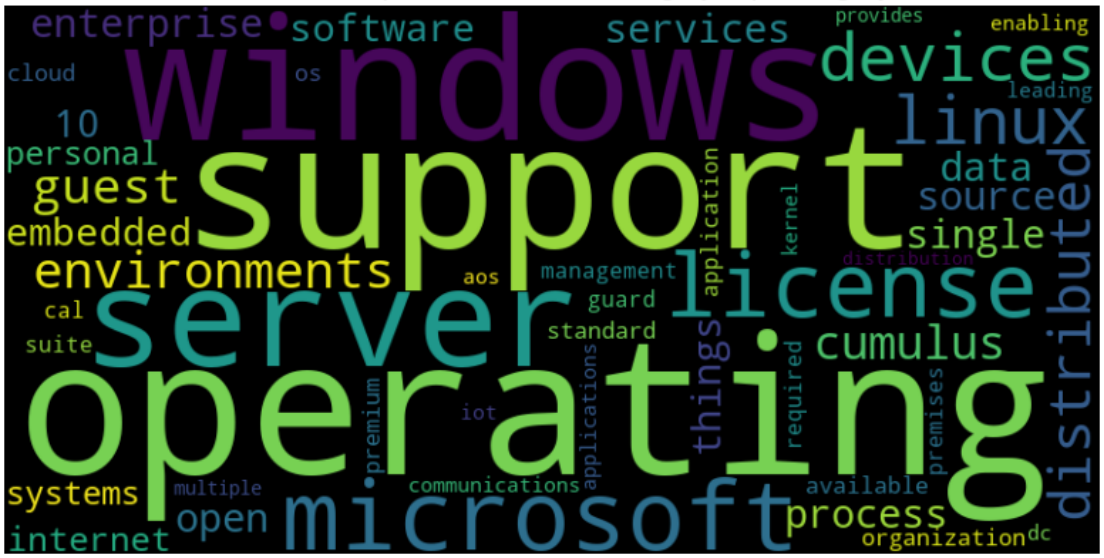



Word Cloud for Unique Words in Sub-Category: Inventory Management

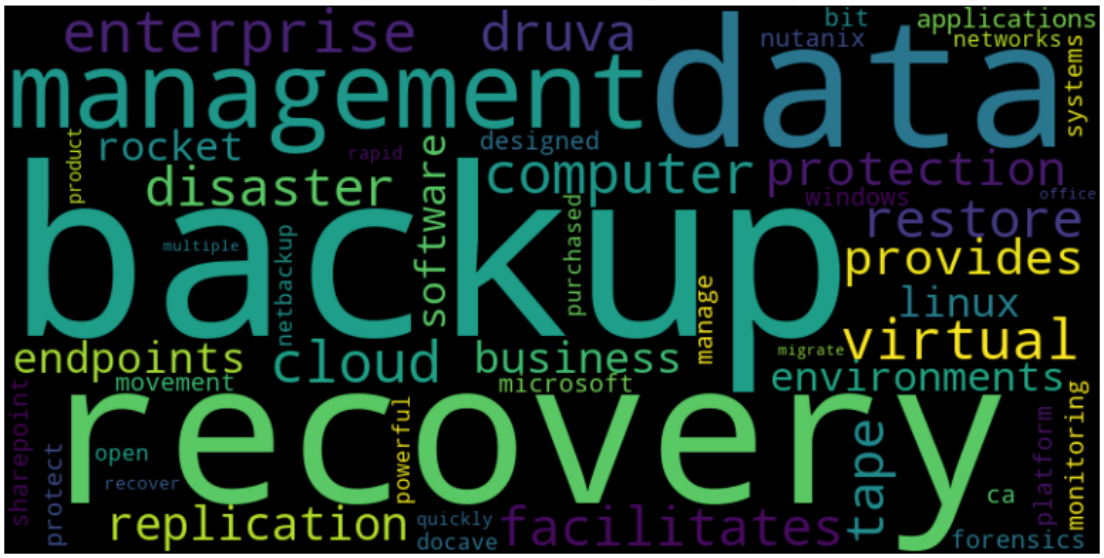


Word Cloud for Unique Words in Sub-Category: Call Handling

Word Cloud for Unique Words in Sub-Category: Operating Systems



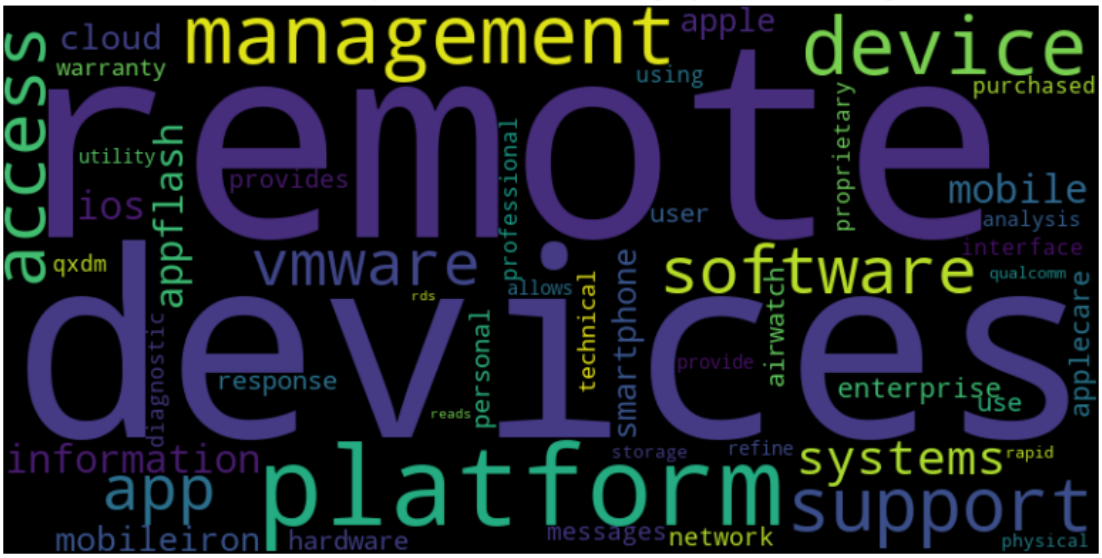
Word Cloud for Unique Words in Sub-Category: Backup and Recovery



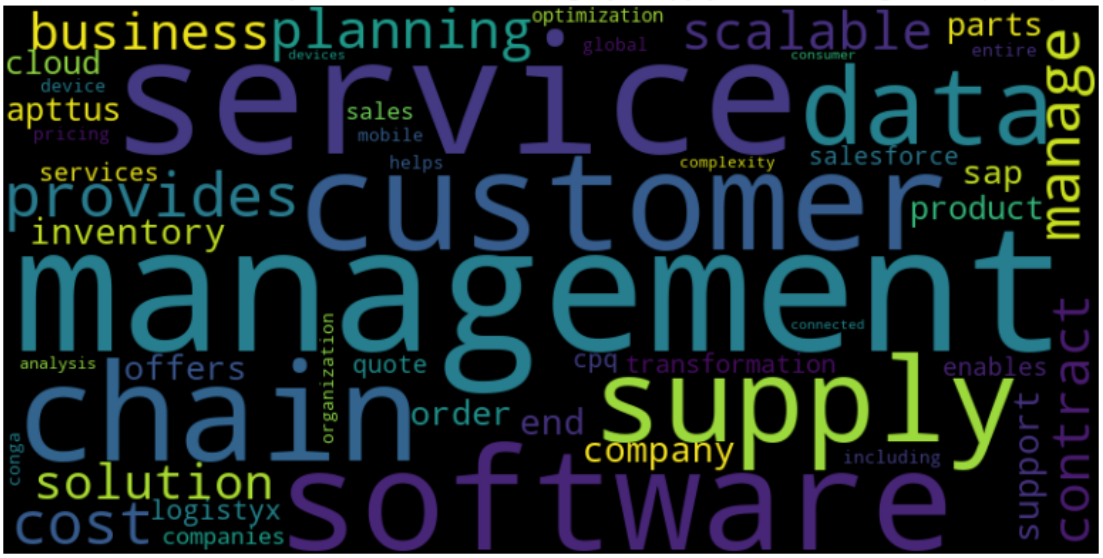

Word Cloud for Unique Words in Sub-Category: Mainframe

Word Cloud for Unique Words in Sub-Category: Enterprise Services Management (ESM)

Word Cloud for Unique Words in Sub-Category: Device Management

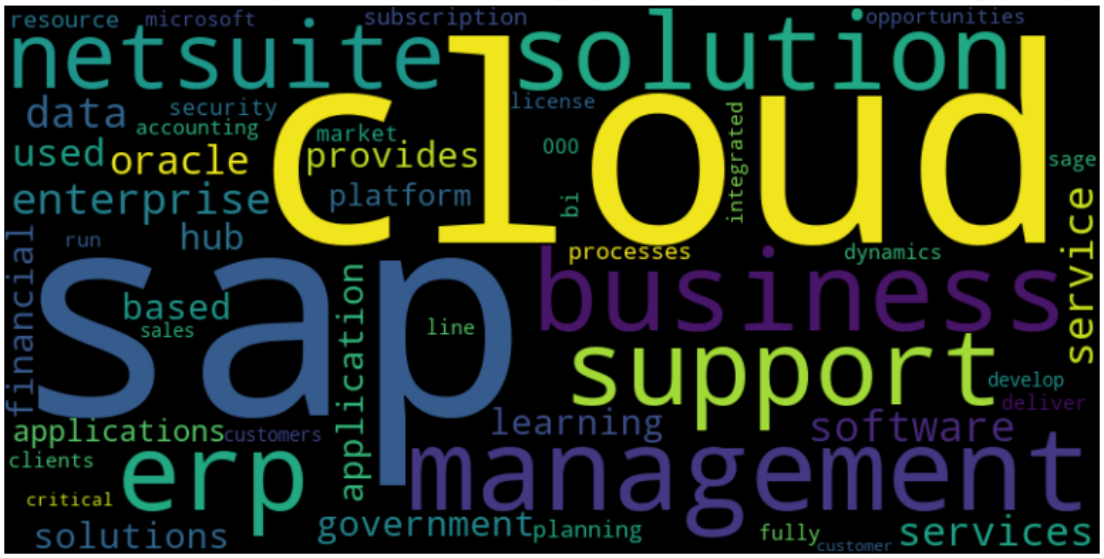


Word Cloud for Unique Words in Sub-Category: Supply Chain Management (SCM)

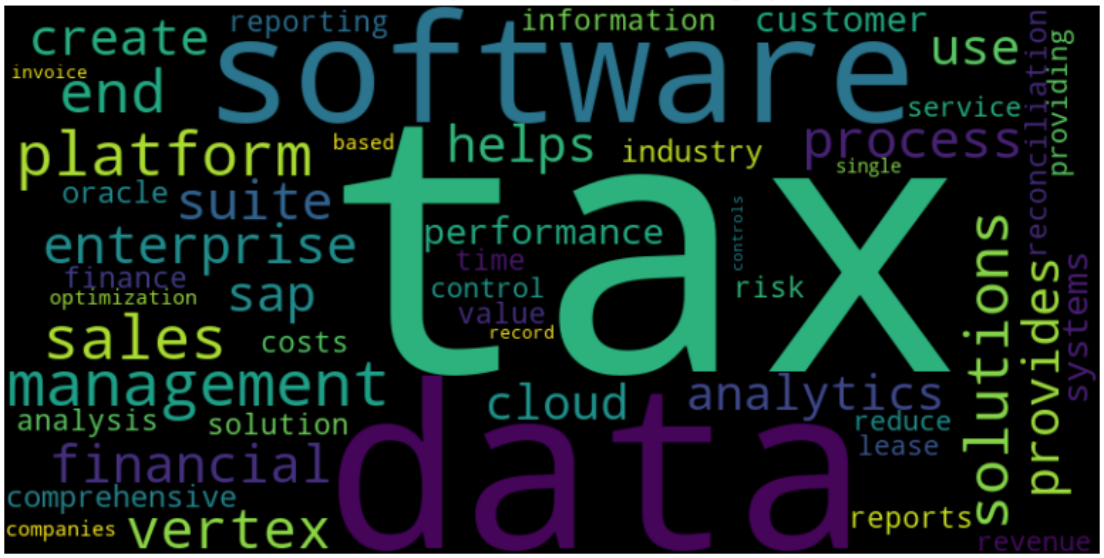



Word Cloud for Unique Words in Sub-Category: Human Resources Management (HRM)

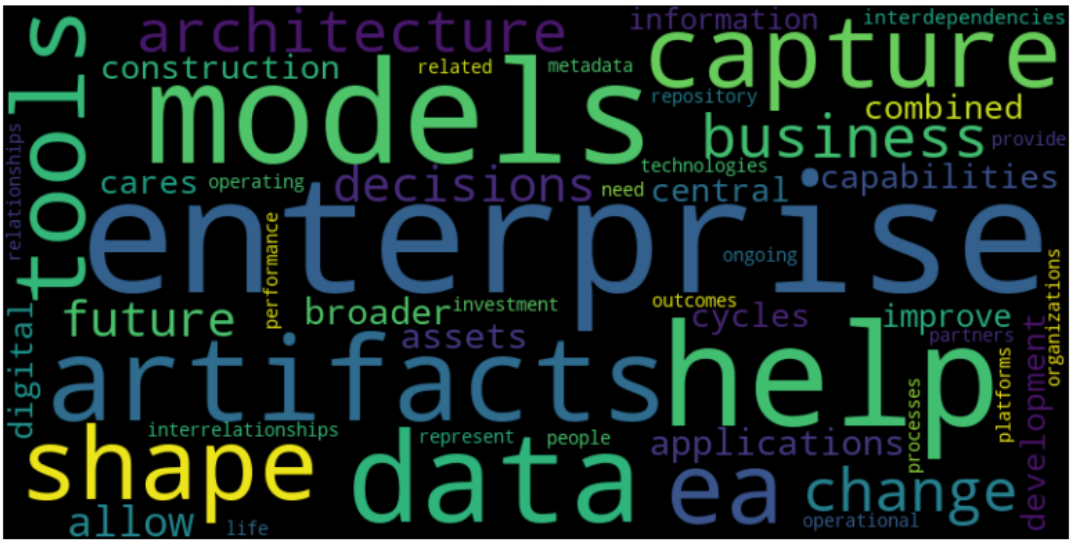
Word Cloud for Unique Words in Sub-Category: Enterprise Resource Planning (ERP)




Word Cloud for Unique Words in Sub-Category: Finance



Word Cloud for Unique Words in Sub-Category: Enterprise Architecture Management (EAM)




Word Cloud for Unique Words in Sub-Category: Field / Dispatch Services Management (FDSM)

LDA Can help with the following: identify Key Themes: LDA shows the main words that describe each category, like “data” and “analytics” for BI & Data Analytics or “service” and “network” for Telecom Network Management.

Useful Features for Models: The common words found by LDA can be used to help machine learning models categorize new products by focusing on words that stand out in each category.

Improve Product Descriptions: LDA helps optimize product descriptions by making sure important terms are included, making it easier to categorize and find products.

[44]:
```
from sklearn.decomposition import LatentDirichletAllocation
from sklearn.feature_extraction.text import TfidfVectorizer

# Define the TF-IDF vectorizer
tfidf_vectorizer = TfidfVectorizer(stop_words='english')

# Apply LDA to find topics in product descriptions
lda = LatentDirichletAllocation(n_components=5, random_state=42)

# Loop through each category and apply LDA
for category in merged_df['taxonomy_category'].unique():
    category_data = merged_df[merged_df['taxonomy_category'] ==␣
 ↪category]['product_description'].dropna()
    tfidf_matrix = tfidf_vectorizer.fit_transform(category_data)
    lda.fit(tfidf_matrix)

    print(f"Category: {category}")
    print(f"Top words per topic for LDA:")

    for idx, topic in enumerate(lda.components_):
        print(f"Topic {idx + 1}: ", [tfidf_vectorizer.
 ↪get_feature_names_out()[i] for i in topic.argsort()[-10:]])
    print("\n")
```

```
Category: BI & Data Analytics
Top words per topic for LDA:
Topic 1:  ['integration', 'ibm', 'service', 'analytics', 'informatica', 'cloud',
'platform', 'enterprise', 'business', 'data']
Topic 2:  ['collibra', 'business', 'management', 'enables', 'enterprise',
'platform', 'provides', 'catalog', 'query', 'data']
Topic 3:  ['source', 'cdp', 'analytics', 'platform', 'hdp', 'new', 'ibm',
'large', 'cloud', 'data']
Topic 4:  ['make', 'decisions', 'search', 'discover', 'analyze', 'analytics',
'business', 'intelligence', 'organization', 'data']
Topic 5:  ['bi', 'cloud', 'sap', 'insights', 'premium', 'informatica',
'business', 'enterprise', 'analytics', 'data']


Category: Performance, Monitoring & Logging
Top words per topic for LDA:
Topic 1:  ['apm', 'cloud', 'ca', 'helps', 'management', 'operations', 'systems',
'application', 'performance', 'data']
Topic 2:  ['os', 'systems', 'services', 'nagios', 'application', 'sql',
'network', 'monitoring', 'tmon', 'asg']
Topic 3:  ['application', 'software', 'targets', 'distribute', 'incoming',
'management', 'network', 'traffic', 'performance', 'monitoring']
Topic 4:  ['cisco', 'platform', 'management', 'solution', 'splunk',
```

'monitoring', 'software', 'performance', 'data', 'network']
Topic 5: ['search', 'solarwinds', 'aws', 'solution', 'elasticsearch', 'cloud', 'performance', 'management', 'network', 'data']

Category: AI & ML
Top words per topic for LDA:
Topic 1: ['agent', 'swim', 'bots', 'ai', 'cloud', 'informatica', 'premium', 'platform', 'human', 'data']
Topic 2: ['applications', 'generative', 'insights', 'key', 'source', 'bots', 'server', 'ai', 'room', 'control']
Topic 3: ['applications', 'scale', 'network', 'way', 'organizations', 'asapp', 'people', 'company', 'data', 'platform']
Topic 4: ['help', 'environment', 'exceptional', 'robot', 'models', 'verint', 'modeling', 'provides', 'network', 'solutions']
Topic 5: ['natural', 'train', 'build', 'performance', 'amazon', 'machine', 'learning', 'service', 'text', 'speech']

Category: Geographic Information Systems (GIS)
Top words per topic for LDA:
Topic 1: ['available', 'service', 'retail', 'platform', 'postal', 'information', 'usps', 'location', 'data', 'address']
Topic 2: ['matches', 'driving', 'prospector', 'enterprise', 'building', 'location', 'provided', 'developers', 'bing', 'canadian']
Topic 3: ['use', 'area', 'local', 'lata', 'quality', 'data', 'gis', 'leading', 'single', 'smartfabric']
Topic 4: ['create', 'maps', 'business', 'estimates', 'population', 'pitney', 'bowes', 'data', 'census', 'address']
Topic 5: ['digital', 'spatial', 'web', 'product', 'mapping', 'real', 'wireless', 'data', 'time', 'maps']

Category: Management & Governance
Top words per topic for LDA:
Topic 1: ['project', 'center', 'discovery', 'solution', 'risk', 'asset', 'devices', 'data', 'management', 'software']
Topic 2: ['platform', 'mobileiron', 'product', 'agile', 'jira', 'enterprise', 'lifecycle', 'remote', 'software', 'management']
Topic 3: ['bigfix', 'engineering', 'helps', 'tag', 'location', 'systems', 'policies', 'data', 'vendor', 'cloud']
Topic 4: ['sap', 'governance', 'project', 'applications', 'tririga', 'management', 'construction', 'quality', 'risk', 'ibm']
Topic 5: ['infrastructure', 'assets', 'enables', 'fully', 'strategy', 'based', 'management', 'data', 'platform', 'cloud']

Category: Digital Workplace

```
Top words per topic for LDA:
Topic 1:  ['microsoft', 'based', 'slack', 'control', 'cloud', 'solution',
'office', 'suite', 'software', 'productivity']
Topic 2:  ['citrix', 'open', 'viewer', 'collaboration', 'applications', 'teams',
'data', 'virtual', 'management', 'apps']
Topic 3:  ['chromebox', 'connect', 'host', 'cloud', 'polling', 'events',
'management', 'platform', 'meetings', 'whiteboard']
Topic 4:  ['oriented', 'collaboration', 'dedicated', 'premium', 'project',
'support', 'odbc', 'imaging', 'laptop', 'google']
Topic 5:  ['provides', 'pro', 'create', 'software', 'audio', '365', 'pdf',
'office', 'video', 'microsoft']


Category: IT Infrastructure Software Services
Top words per topic for LDA:
Topic 1:  ['product', 'services', 'management', 'storage', 'software',
'database', 'platform', 'service', 'data', 'cloud']
Topic 2:  ['terminal', 'access', 'storage', 'provides', 'systems', 'support',
'managed', 'windows', 'data', 'file']
Topic 3:  ['applications', 'relational', 'mysql', 'application', 'database',
'data', 'management', 'software', 'microsoft', 'server']
Topic 4:  ['storage', 'use', 'cloud', 'service', 'performance', 'software',
'provides', 'remote', 'enterprise', 'data']
Topic 5:  ['services', 'oracle', 'amazon', 'storage', 'os', 'databases',
'database', 'management', 'data', 'cloud']


Category: Marketing Management
Top words per topic for LDA:
Topic 1:  ['analytics', 'service', 'crm', 'alternative', 'linkage', 'mobile',
'cloud', 'platform', 'data', 'salesforce']
Topic 2:  ['business', 'cloud', 'data', 'customers', 'product', 'service',
'customer', 'journey', 'marketing', 'platform']
Topic 3:  ['services', 'experience', 'social', 'business', 'platform', 'adobe',
'email', 'marketing', 'customer', 'data']
Topic 4:  ['apps', 'intelligence', 'forrester', 'signal', 'research',
'intelligent', 'sensor', 'customer', 'digital', 'data']
Topic 5:  ['product', 'sites', 'marketing', 'emails', 'tag', 'service', 'data',
'manager', 'software', 'tv']


Category: Customer Operational Platforms
Top words per topic for LDA:
Topic 1:  ['payment', 'service', 'connect', 'cloud', 'customer', 'chatbot',
'services', 'platform', 'enables', 'software']
Topic 2:  ['provides', 'based', 'solution', 'data', 'revenue', 'communications',
'software', 'sales', 'management', 'customer']
Topic 3:  ['intelligence', 'helps', 'center', 'numbers', 'contact', 'software',
```

'customers', 'sales', 'service', 'customer']
Topic 4: ['manager', 'billing', 'support', 'operations', 'payments', 'email', 'time', 'platform', 'salesforce', 'data']
Topic 5: ['management', 'provides', 'speech', 'customer', 'verint', 'interaction', 'manager', 'revenue', 'communications', 'oracle']

Category: Enterprise Platforms
Top words per topic for LDA:
Topic 1: ['sap', 'secure', 'management', 'software', 'data', 'automation', 'provides', 'end', 'business', 'content']
Topic 2: ['storage', 'limit', 'service', 'end', 'support', 'pdf', 'management', 'production', 'tax', 'content']
Topic 3: ['ea', 'artifacts', 'data', 'capture', 'platform', 'management', 'help', 'models', 'enterprise', 'business']
Topic 4: ['process', 'software', 'tax', 'management', 'global', 'service', 'sap', 'customer', 'cloud', 'data']
Topic 5: ['erp', 'service', 'services', 'software', 'sap', 'business', 'data', 'platform', 'enterprise', 'management']

Category: Telecom Network Management
Top words per topic for LDA:
Topic 1: ['rf', 'fi', 'line', 'order', 'network', 'manager', 'consolidation', 'service', 'frame', 'work']
Topic 2: ['central', 'order', 'data', 'control', 'cisco', 'administration', 'service', 'element', 'provides', 'management']
Topic 3: ['npac', 'tool', 'service', 'nnmi', 'service_assurance_', '_mobile_workforce_systems', 'exfoworx', 'network', 'data', 'performance']
Topic 4: ['enables', 'networks', 'support', 'modelling', 'operations', 'management', '5g', 'software', 'end', 'network']
Topic 5: ['aircraft', 'work', 'receive', 'track', 'polling', 'network', 'application', 'test', 'service', 'end']

Category: Emerging Technologies
Top words per topic for LDA:
Topic 1: ['new', 'operators', 'paving', 'processes', 'remove', 'saving', 'automated', 'reconciliation', 'roaming', 'settlement']
Topic 2: ['designed', 'supporting', 'reality', 'services', 'web', 'platform', 'based', 'work', 'mobile', 'iot']
Topic 3: ['designed', 'supporting', 'reality', 'services', 'web', 'platform', 'based', 'work', 'mobile', 'iot']
Topic 4: ['advancing', 'iot', 'services', 'products', 'web', 'mobilogix', '3d', 'virtual', 'reality', 'world']
Topic 5: ['personal', 'uipath', 'portion', 'designed', 'attended', 'assistants', 'robots', 'supporting', 'macrometa', 'data']

```
Category: Design, Development & Delivery
Top words per topic for LDA:
Topic 1:  ['tools', 'testing', 'ios', 'development', 'data', 'application',
'software', 'management', 'language', 'programming']
Topic 2:  ['apps', 'web', 'server', 'cobol', 'software', 'mobile', 'visual',
'environment', 'development', 'studio']
Topic 3:  ['cloud', 'infrastructure', 'engine', 'software', 'services',
'network', 'ibm', 'code', 'applications', 'design']
Topic 4:  ['development', 'application', 'jenkins', 'data', 'mainframe',
'developers', 'solution', 'test', 'platform', 'devops']
Topic 5:  ['business', 'javascript', 'build', 'open', 'help', 'data', 'source',
'platform', 'applications', 'code']
```

**Analysis for the above data** BI & Data Analytics: The topics highlight the focus on data integration, analytics, and business intelligence. Common terms like "data," "analytics," "platform," and "cloud" suggest a strong emphasis on data-driven decision-making and cloud-based platforms. There are also references to specific tools like Informatica and Collibra, indicating key players in this space.

Performance, Monitoring & Logging: The top words in this category revolve around application performance monitoring (APM) and network monitoring. Tools like Nagios, Splunk, and SolarWinds appear frequently, indicating the centrality of monitoring solutions for ensuring system performance and managing infrastructure.

AI & ML: The LDA results here focus heavily on AI platforms, bots, and machine learning applications. Words like "agent," "generative," "modeling," and "natural" suggest an interest in AI-driven solutions and machine learning models. This category's topics reflect a strong focus on building AI applications at scale.

Geographic Information Systems (GIS): GIS topics reflect the importance of location-based data, mapping, and spatial analysis. Terms like "location," "maps," "census," and "address" dominate the topics, reflecting the utility of GIS technology for various sectors that depend on geographic data.

Management & Governance: This category centers on project management, governance, and risk management. Topics like "risk," "assets," and "governance" suggest a focus on ensuring compliance and managing enterprise projects. Specific tools like JIRA and BigFix show the importance of project management software.

Digital Workplace: LDA topics here highlight tools like Microsoft 365, Slack, and Citrix, reflecting the importance of collaboration tools and cloud-based office productivity software in supporting a remote or hybrid work environment. Terms like "productivity," "cloud," and "virtual" reinforce this focus.

IT Infrastructure Software Services: Common themes include cloud services, storage, and database management. Words like "storage," "database," and "platform" highlight the focus on data management and infrastructure solutions. Tools like Oracle and Amazon Web Services reflect key service providers.

Marketing Management: The recurring topics here emphasize customer relationship management (CRM), analytics, and marketing automation. Words like "CRM," "customers," "salesforce," and "email" point to the centrality of customer data platforms and marketing technologies in managing customer interactions.

Customer Operational Platforms: The focus is on customer management, communications, and revenue operations. Frequent words like "customer," "billing," "communications," and "platform" reflect the importance of tools that help manage customer relationships and streamline operations.

Enterprise Platforms: Key terms include ERP, SAP, and business process management (BPM). This category is focused on enterprise resource planning and automation, with tools for managing large-scale operations and business processes like SAP and EA frameworks.

Telecom Network Management: This category's topics center around network operations, 5G, and service management. Words like "network," "management," "5G," and "operations" suggest a focus on managing complex telecom networks, including both hardware and software aspects.

Emerging Technologies: The topics show a focus on new technologies like IoT, augmented reality, and blockchain. Words like "virtual," "reality," "robots," and "web" highlight cutting-edge technologies and platforms designed to integrate new developments in the tech space.

We can use NER to help identify key entities like organizations, people, and locations in text.

[43]:
```
import spacy

nlp = spacy.load("en_core_web_sm")

# Perform NER for each category
for category in merged_df['taxonomy_category'].unique():
    category_data = merged_df[merged_df['taxonomy_category'] ==␣
 ↪category]['product_description'].dropna()
    text = ' '.join(category_data)

    # Process the text for NER
    doc = nlp(text)

    print(f"Category: {category}")
    print("Named Entities:")
    for ent in doc.ents:
        print(ent.text, ent.label_)
    print("\n")
```

```
Category: BI & Data Analytics
Named Entities:
Informatica Intelligent Cloud Services ORG
MicroStrategy ORG
BI ORG
HyperIntelligence ORG
MicroStrategy ORG
one CARDINAL
```

The Signature Services ORG
Customer ORG
Vizlib PERSON
third ORDINAL
Qlik Sense PERSON
Qlik Engine API LOC
Qlik Sense PERSON
Informatica PowerCenter ORG
PowerConnect Adapters ORG
Fivetran PERSON
Alteryx Server PERSON
BI GPE
Hyperion BI Development Analysis ORG
Wireless ORG
BI ORG
Domo, Inc ORG
Looker ORG
Amazon Kinesis Data Firehose ORG
Amazon Simple Storage Service AWS ORG
ETL ORG
Amazon Mobile Analytics ORG
Apache Hadoop ORG
Spark ORG
Opensource Apache Superset ORG
Cloudera Dataflow PERSON
CDF ORG
DataFlow PRODUCT
Cloudera PERSON
Hortonworks Data Platform ( LAW
HDP ORG
HDP ORG
Erwin Data Modeler ORG
DM GPE
ERwin ORG
Data Modeler PERSON
All Fusion Data Modeler ORG
ERwin ORG
Data Modeler PERSON
Data Modeler ORG
Informatica Data Quality ORG
Informatica ORG
Model ORG
Informatica Data Quality ORG
The Right Deployment Model for the Right Use Case ORG
Informatica Data Quality ORG
Informatica PowerCenter ORG
ETL ORG
Informatica PowerCenter ORG

Test Data Management PeopleSoft Application Accelerator ORG
Test Data Management SAP Application Accelerator ORG
Test Data Management Siebel Application Accelerator ORG
The K2View Test Data Management ORG
K2View PERSON
K2View ADI PERSON
K2View Fabric PERSON
Kyvos PERSON
American NORP
Kyvos Insights WORK_OF_ART
Logi Analytics PERSON
BI ORG
every day DATE
Oracle Business Intelligence Suite ORG
BI ORG
BI ORG
SAP BusinessObjects ORG
BO ORG
BI ORG
Cloud Einstein PERSON
CRM PRODUCT
Cloud Einstein PERSON
Inbox ORG
Tableau Software PERSON
a Business Intelligence and Data ORG
Tableau GPE
the Business Intelligence Industry ORG
Tableau GPE
Visualize ORG
Dundas BI PERSON
HeavyConnect PERSON
SQL ORG
GPU ORG
CPU ORG
up to billions CARDINAL
SQL ORG
thousands CARDINAL
the Data Observatory ORG
Data Scientists, Analysts & Developers ORG
Alteryx Designer PERSON
Alteryx Designer PERSON
Windows NORP
Alteryx NORP
apps PERSON
Spatial ORG
TomTom ORG
the U.S. Census ORG
Alteryx PRODUCT

SAS ORG
SAS ORG
IBM ORG
IBM ORG
IBM ORG
AI IBM InfoSphere DataStage ORG
ETL ORG
the IBM Information Platforms Solutions ORG
IBM ORG
InfoSphere PRODUCT
the Server Edition ORG
minutes not hours TIME
IBM ORG
Query Management Facility ORG
IBM ORG
IBM ORG
IBM ORG
IBM ORG
Cloudera PERSON
CDP ORG
CDP ORG
easier data management ORG
CDP ORG
CDH Power BI ORG
Microsoft ORG
Power BI ORG
apps ORG
Excel PRODUCT
ETL ORG
Talend Big Data ORG
TIBCO GPE
Oracle Hyperion Planning ORG
Hyperion ORG
Oracle NORP
CPM ORG
Hyperion ORG
BP&F ORG
treasury ORG
Collibra ORG
one CARDINAL
Collibra PRODUCT
Cloud PERSON
Data Catalog ORG
Data Governance PERSON
HDInsight ORG
Apache Hadoop ORG
Azure PRODUCT
HDFS ORG

MapReduce ORG
Hortonworks Data Platform ( LAW
HDP ORG
HDP ORG
Amazon EMR ORG
petabyte NORP
Apache Spark ORG
Apache Hive PERSON
Presto ORG
Amazon Redshift ORG
petabyte NORP
SQL ORG
IBM ORG
Aspera PERSON
The Oracle Exadata Database Machine ORG
Oracle Database GPE
Exadata ORG
Teradata Corp. ORG
Informatica ORG
Informatica Master Data Management ORG
Oracle Data Relationship Governance ORG
Presto PERSON
SQL ORG
HDFS ORG
Presto PERSON
Hadoop ORG
Starburst Enterprise ORG
Trino PERSON
Trino PERSON
BigQuery ORG
Quill ORG
SAP Business Technology Platform ORG
Axon PERSON
metadata PERSON
metadata PERSON
first ORDINAL
Informatica Data Validation Option ORG
PowerCenter ORG
AML ORG
Latin_1/International ORG
US GPE
Canado PRODUCT
Informatica ORG
DSG ORG
ILM ORG
Excel PRODUCT
SAP BusinessObjects ORG
IBM ORG

MicroStrategy ORG
Multidimensional ORG
Disk ORG
The Profiling Service Module ORG
the Data Integration Service ORG
the Data Integration Service ORG
The Profiling Service Module ORG
metadata PERSON
Data Integration Service ORG
the Data Integration Service ORG
Starburst Enterprise ORG
Trino PERSON
Presto® SQL ORG
Trino PERSON
Premium Success for Subscription ORG
Professional Services - Fixed Fee Consulting Informatica Data Privacy Management ORG
Informatica Data Privacy Management ORG
Cloud Systems ORG
the Informatica Cloud Data Synchronization Service ORG
Informatica Enterprise Data ORG
SQL ORG
Informatica Enterprise Data ORG
SQL ORG
Cloud Dataflow PERSON
MarkLogic Server Enterprise Edition ORG
Dash Enterprise ORG
Mixpanel PERSON
Cribl Stream ORG
Cribl Edge ORG
Stream GPE
Cribl Edge ORG
IBM ORG
IBM ORG
third ORDINAL
IBM ORG
PAK ORG
SUBSCRIPTION & SUPPORT RENEWAL ORG
PAK ORG
second ORDINAL
Premium Success for Subscription ORG
Professional Services - Fixed Fee Consulting ORG
Informatica ORG
Cloud Data Integration-Free ORG
Minitab PERSON
Minitab PERSON
one CARDINAL
two CARDINAL

IBM ORG
IBM ORG
Arria NLG PERSON
GoJS ORG
JavaScript ORG
Oracle Analytics Server Administrator ORG
Oracle Business Server Administrator ORG
Oracle Analytics Server Administrator ORG
Oracle Analytics Server Enterprise Edition ORG
1 CARDINAL
The Informatica Intelligent Data Management Cloud ORG
IDMC ORG
AI ORG
API ORG
Subscription ORG
ELA ORG
Description
API & App Integration ORG
Asset Import/Export ORG
Management
Data Integration ORG
Data Privacy Management ORG
Data Stores ORG
Annual DATE
Informatica Cloud Data Masking ORG
Informatica ORG
Informatica Cloud Secure ORG
Cloud Base GPE
Integration Base WORK_OF_ART
Base Sandbox PERSON
Base Sandbox PERSON
per consecutive month DATE
Cloud Base GPE
Linear Taskflow
Management Console
Premium Success for Subscription
Shared Services FAC
GitHUB
Tier A Connectors Unlimited ORG
Tier B Connectors Unlimited ORG
Tier C Connectors Unlimited ORG
Tier D Connectors Unlimited ORG
OpenText ORG
IBM ORG
PL/I and COBOL development ORG
Cloud PERSON
Tellius ORG
Teradata Analytics for Enterprise Applications ORG

SAP ERP ORG
SAP CRM ORG
Oracle E-Business Suite ORG
EBS ORG
Oracle PeopleSoft ORG
ConText Module ORG
S4-BX-FA PRODUCT
Alteryx Auto Insights PERSON
Alteryx Intelligence Suite PERSON
Spatial ORG
TomTom ORG
the U.S. Census ORG
Alteryx PRODUCT

Category: Performance, Monitoring & Logging
Named Entities:
Grafana Enterprise ORG
Grafana GPE
Grafana PERSON
data & to monitor ORG
APM Argent ORG
4/1/2020 Allowed FAC
Analyze PRODUCT
CA eHealth ORG
CA ORG
third ORDINAL
API ORG
QA ORG
DevOps ORG
API ORG
API ORG
Datadog ORG
System Center Operations ORG
SCOM GPE
Microsoft Windows Server ORG
PagerDuty PERSON
Voice Watch ORG
Diagnostix PERSON
OneSight ORG
IntelliSight ORG
Maintenance Support PERSON
XMS Hardware ORG
Company ORG
Hammer
Empirix ORG
Hammer PERSON
SysAdmins ORG

SolarWinds ORG
LiveSource ORG
one CARDINAL
Storage Resource Monitor ORG
SRM ORG
IPAM ORG
IP ORG
IP ORG
IP ORG
DHCP ORG
DNS ORG
IP ORG
Qbox PERSON
Qbox PERSON
Elasticsearch PERSON
Elasticsearch ORG
CloudTrail ORG
Config PERSON
AWS ORG
Distribute ORG
Distribute ORG
Amazon Route ORG
Domain Name System ORG
Amazon Virtual Private Cloud ORG
Amazon Web Services Cloud ORG
AppDynamics ORG
V19G PRODUCT
CMF MONITOR is'a ORG
CMF MONITOR ORG
BMC Software ORG
CMF MONITOR ORG
CMF ORG
MIPS ORG
DB2 & AMI Ops Monitor for ORG
CMF Product ORG
CA Network Flow Analysis ORG
Network Flow Analysis ORG
the CA Technologies Application-Driven Network Performance Management ORG
CA Application Performance Management ORG
CA APM PERSON
The Automic@ Release Automation ORG
ARA ORG
ARA ORG
CA App Services ORG
Element Management Syste ORG
CA NetMaster Network Automation ORG
SNA ORG
SNA ORG

CA Spectrum PERSON
CA Spectrum PERSON
CA Spectrum ORG
SDN ORG
CA Spectrum PERSON
CA SystemEDGE PERSON
Infrastructure Management ORG
UIM ORG
UIM ORG
Unified Infrastructure Management ORG
CA Performance Management ORG
CA Spectrum ORG
the SDN/NFV EVENT
Cisco Data Center Network ORG
DCNM ORG
the Cisco Unified Fabric GPE
Dynatrace ORG
APM ORG
AIOps ORG
Apache Lucene PERSON
first ORDINAL
2010 DATE
Elasticsearch PERSON
Lucene PERSON
Kibana PERSON
the Elastic Stack FAC
Elasticsearch ORG
IBM ORG
Control Center ORG
management'system PERSON
Configuration Managers ORG
one CARDINAL
IBM Netcool Network Management ORG
IBM ORG
IDERA SQL Diagnostic ORG
SQL Server ORG
VistaCockpit PERSON
VistaCockpit PERSON
InfoVista ORG
Progress Micro Focus Application Performance Management ORG
Micro Focus Business Process Monitor ORG
Micro Focus Diagnostics'is PERSON
the Application Performance Management ORG
Network Capture ORG
The Micro Focus'ITOM Platform ORG
first ORDINAL
AIOps ORG
Micro Focus Performance Center ORG

hundreds or thousands CARDINAL
Micro Focus' Network Operations'Management ORG
first ORDINAL
neous'network ORG
Micro Focus SiteScope'software ORG
more than 100 CARDINAL
Moogsoft AIOps'(Artificial Intelligence for IT Operations ORG
Moogsoft PERSON
DevOps ORG
Moogsoft PERSON
Open Source FAC
Core PERSON
Linux PERSON
NETSCOUT ORG
the nGeniusONE  Service Assurance ORG
HttpWatch ORG
HTTP NORP
HTTP ORG
HTTPS ORG
New Relic APM NORP
New Relic NORP
The NXLog Enterprise Edition ORG
NXLog Enterprise Edition ORG
UDP ORG
TCP ORG
TLS/SSL ORG
The Avi Networks ORG
SuperVision ORG
Data Center Management Suite ORG
Global Interface Solutions ORG
VMware ORG
SQL PERSON
SQL Server ORG
Oracle ORG
SAP ASE ORG
Multi-Dimensional Performance Analysis' ORG
DPA ORG
Syncsort Optimize DB2 ORG
SQL ORG
SQL ORG
Syncsort Optimize DB2 ORG
Workload-Centric ORG
Workload-Aware ORG
SQL ORG
Using Syncsort Optimize DB2 ORG
SQL ORG
SQL ORG
SQL ORG

Splunk NORP
Windows & macOS ORG
The Observer Platform WORK_OF_ART
NPMD ORG
first ORDINAL
NetComplete ORG
EtherAssure ORG
the Observe Platform per the Viavi LAW
Zabbix GPE
Hawkeye GPE
Chariot ORG
NVS ORG
BreakingPoint ORG
The Keysight Security Fabric ORG
The Avi Networks ORG
Cisco Intersight ORG
Kubernetes ORG
Cisco Intersight ORG
Cisco GPE
Software PERSON
Cisco GPE
UCS ORG
HyperFlex PRODUCT
third ORDINAL
Cisco GPE
apps PERSON
Fluentd WORK_OF_ART
Fluentd WORK_OF_ART
Combine Network ORG
SamKnows ORG
Core Analytics ORG
MyConnection Server ORG
Online ORG
VoIP LOC
UC GPE
CC GPE
UC Operations ORG
Improve Prognosis ORG
Quick Troubleshooting PERSON
SevOne PRODUCT
Turbonomic GPE
2019 DATE
Turbonomic GPE
SevOne ORG
2021 DATE
IBM ORG
IBM ORG
IBM SevOne Network Performance Management (NPM ORG

Amazon Web Services ORG
CloudWatch Logs PERSON
AWS ORG
OpenSearch ORG
Apache PRODUCT
2.0 CARDINAL
100% PERCENT
log analytics PERSON
Elastic NORP
ENCS ORG
the Cisco SD-Branch ORG
Total Cost of Ownership (TCO WORK_OF_ART
ArcSight Logger ORG
Cisco GPE
SD Access ORG
Cisco GPE
Stealthwatch ORG
Cisco GPE
Cisco GPE
SD Access ORG
Cisco GPE
Cisco GPE
SD Access ORG
Cisco GPE
Stealthwatch ORG
Cisco GPE
Cisco GPE
SD Access ORG
Cisco GPE
Cloudian NORP
HAProxy Enterprise - Software Load Balancer & Application ORG
Management Systems ORG
Operations ORG
Deploying TEMS Sense ORG
first ORDINAL
Staying PERSON
8.4 CARDINAL
KEMP Virtual LoadMaster ORG
VLM ORG
LoadMaster ORG
Cloud PERSON
VMware ORG
Hyper-V ORG
VirtualBox ORG
Xen PERSON
VLM ORG
IoT Platforms ORG
alert thresholds PERSON

ControlUp ORG
pre-Nutanix ORG
Nutanix ORG
Affordable PERSON
Windows NORP
Kiwi CatTools PERSON
IP ORG
IP & ORG
SMS ORG
Mobile Client ORG
Monyog ORG
Monyog ORG
Splunk Enterprise Security ORG
SOC ORG
Network Analyzer PERSON
Nagios Fusion ORG
Nagios Core ORG
XI PERSON
XI ORG
Hundreds CARDINAL
third ORDINAL
Log Server PERSON
one CARDINAL
8) MONEY
Annual DATE
133024956 DATE
CMDB System ORG
MQEnterprise Adapter ORG
TMON ORG
MQ Enterprise Edition ORG
TMON ORG
MQ Enterprise Edition ORG
CICS ORG
GUI ORG
CICS ORG
Parallel Sysplex PRODUCT
GUI ORG
Safari PERSON
Windows ORG
Microsoft ORG
ODBC ORG
133024956 DATE
The SQL Analyzer EVENT
SQL ORG
SQL Analyzer ORG
TMON ORG
Network Performance Management TAM ORG
SevOne ORG

Turbonomic GPE
2019 DATE
Turbonomic GPE
SevOne ORG
2021 DATE
IBM ORG
IBM ORG
IBM SevOne Network Performance Management (NPM ORG
IR ORG
Avaya DevConnect Technology Partner ORG
The Prognosis for Unified Communications Solution ORG
Prognosis ORG
SightLine Data Collection Power Agents ORG
SightLine EDM PRODUCT
SightLine ORG
CPU ORG
Memory, Disk, Network and File Systems ORG
hundreds CARDINAL
Process Information ORG
Cribl Stream ORG
Cribl Edge ORG
Stream GPE
Cribl Edge ORG
ExtremeCloud IQ ORG
1 CARDINAL
Kiwi Syslog Server - Single Install PERSON
2 CARDINAL
SolarWinds IP Address ORG
3 CARDINAL
SolarWinds Network Performance Monitor SLX ORG
4 CARDINAL
SolarWinds Database Performance Analyzer ORG
SQL Server ORG
Oracle SE PERSON
PostgreSQL Instance WORK_OF_ART
1 to 4 CARDINAL
5 CARDINAL
SolarWinds Serv-U Managed File Transfer Server Per Seat License ORG
1 CARDINAL
6 CARDINAL
SolarWinds Network Topology Mapper-SolarWinds Additional Polling Engine for
SolarWinds Unlimited Licenses ORG
7 CARDINAL
SolarWinds High Availability  -Annual ORG
8 CARDINAL
SolarWinds Server & Application Monitor ALX ORG
Citrix NetScaler ADC VPX ORG
Cisco Unified Communications ORG

hundred CARDINAL
one CARDINAL
CDR ORG
Call Detail Records ORG
LogRocket ORG
LogRocket ORG
Software ORG
HPE ORG
ProLiant ORG
Lights Out" designation WORK_OF_ART
Downdetector ORG
Downdetector ORG
Downdetector ORG
Speedtest ORG
Downdetector® ORG
Klearcom ORG
1-800 CARDINAL
IVR ORG
Klearcom ORG
Klearcom ORG
2 CARDINAL
Voicewatch PERSON
Annual DATE
Site ID 122000508 ORG
SQL-Analyzer Computer ORG
Riverbed AppResponse ORG
The Oracle® Communications Operations Monitor ORG
Mediation Engine PERSON
DIAMETER ORG
DNS ORG
ENUM ORG
OCOM Probes PERSON
PingPlotter ORG
millions CARDINAL
the Metrics Datastore LOC
OBR ORG
OBR ORG
Vertica GPE
SAP BusinessObjects ORG
Opsgenie ORG
Opsgenie ORG
Family PRODUCT
Allen Systems Group ORG
NaviGraph PRODUCT
Allen Systems Group ORG
NaviGraph PRODUCT
Allen Systems Group ORG
133024956 DATE

CICS PERSON

Category: AI & ML
Named Entities:
AI ORG
Net Promoter Score ORG
IBM ORG
Oracle Crystal Ball ORG
Amazon Comprehend ORG
NLP ORG
Amazon ORG
Amazon Transcribe ORG
IBM Datacap ORG
IBM ORG
IBM ORG
second ORDINAL
more than 1/3 CARDINAL
DataRobot ORG
Machine Learning ORG
ML ORG
Cloud Service ORG
Software License Agreement ORG
Nuance WORK_OF_ART
the social & chat customer ORG
CMB ORG
Server ORG
Automation Anywhere ORG
Domino PERSON
Domino PERSON
the days DATE
Enable Multi-Cloud Data Science PERSON
Kubernetes, Domino ORG
Domino PERSON
Customer ORG
two CARDINAL
2 CARDINAL
Domino PERSON
Customer ORG
the Contact Centre ORG
Back Office/ Branch FAC
Veveo GPE
late 2012 DATE
Cloud Service License Agreement ORG
ON Cue ORG
FiOS TV ORG
Spanish NORP
Build GPE

The Swim Platform WORK_OF_ART
a Swim Fabric PRODUCT
CCAI ORG
Google Cloud PERSON
Informatica IDMC PERSON
AI ORG
ML ORG
CLAIRE PERSON
ELA Premium Maintenace ORG
Premium Success for Subscription ORG
Professional Services - Fixed Fee Consulting Informatica Data Privacy Management ORG
Couchbase Server PERSON
Membase ORG
NoSQL PRODUCT
Cisco Modeling Labs ORG
Cisco Modeling Labs ORG
Modeling Labs PERSON
Duet AI PERSON
Google Workspace ORG
Duet AI ORG
AI ORG
Google Workspace ORG
Help Me Write ORG
AI ORG
Guardrails for Enterprise Analytics ORG
ChatAible ORG
AI ORG
millions CARDINAL
Generative AI PERSON
Seldon GPE
Machine Learning Models ORG
Seldon GPE
Machine Learning ORG
Blueworx PERSON
Interactive Voice ORG
Linux GPE
IBM ORG
IBM Power Systems ORG
RAM ORG
Apache Ignite PRODUCT

Category: Geographic Information Systems (GIS)
Named Entities:
Precisely Trillium PERSON
AI ORG
Map-Quest ORG

MQ ORG
US GPE
Canada GPE
acoustic NORP
The Wireless Registry Inc. ORG
first ORDINAL
thousands CARDINAL
SDK ORG
Connected2Fiber PERSON
Google Maps ORG
Google ORG
360 CARDINAL
Bing Maps ORG
Microsoft ORG
the Bing Maps for Enterprise ORG
LEC ORG
Pitney Bowes Application Spectrum - Part of ORG
the Enterprise Address Quality Solution ORG
Pitney Bowes ORG
Massachusetts GPE
IP ORG
TAS ORG
GIS ORG
apps. PERSON
TAS ORG
a Kalibrate Company ORG
3 CARDINAL
Geospatial Innovation ORG
GIS ORG
Google Street View ORG
Google Maps ORG
Google Earth ORG
panoramas ORG
2007 DATE
the United States GPE
PxPoint Geocoder ORG
ArcGIS Online PERSON
Esri ORG
apps PERSON
Melissa Data PERSON
the US Postal Service ORG
the United States GPE
MultiNet Enterprise ORG
MNE ORG
Tele Atlas PERSON
Netherlands GPE
1984 DATE
TrafficSense ORG

3 CARDINAL
GNSS ORG
3 CARDINAL
Canadian NORP
Canadian NORP
Canada Post ORG
the United States Postal Service ORG
USPS ORG
USPS ORG
GeoStan ORG
two CARDINAL
one CARDINAL
the U.S. Census Bureau ORG
the U.S. Postal Service ZIP+4 Directory ORG
USPS ORG
the Latitude, Longitude ORG
Census Block PERSON
VeriMove GPE
VeriMove GPE
USPS Change Of Address (COA ORG
World Boundaries Premium ORG
Digital Cities ORG
2D ORG
Oracle Spatial ORG
SQL Server Spatial ORG
Esri ORG
FGBD ORG
ArcGIS Server PERSON
LLC ORG
Lightbox Tool PERSON
Googles ORG
SalesForce Precise ORG
Network planning & engineering ORG
Build GPE
Customer ORG
CRM PRODUCT
Optional Correspondences ORG
Prop Models, Service Areas ORG
CAF Blocks ORG
US Postal Data & Universal AM - US Subscription ORG
USPS Reference File Monthly MailStream Plus ORG
USPS ORG
USPS ORG
The Spectrum Universal Addressing Module ORG
more than 220 CARDINAL
United States Address Fabric ORG
PBKEY GPE
Address Fabric PERSON

Change Log WORK_OF_ART
GeoEnrichment ORG
The Global Geocoding SDK PRODUCT
Spark ORG
Hive ORG
US GPE
Geocode By Key: Accepts WORK_OF_ART
MLD ORG
the United States GPE
MapInfo Pro PERSON
MapInfo Pro PERSON
Earth LOC
AI ORG
Pinpoint ORG
Point Inside ORG
Kinetica ORG
Data Accelerator ORG
AI ORG
LightBox ORG
SmartFabric Professional and SmartFabric Broadband Salesforce Maps Territory
Planning ORG
one CARDINAL
Salesforce CRM PRODUCT
US GPE
the United States GPE
seven CARDINAL
Combine NORP
Hispanic NORP
the Census Bureau's American Community Survey ORG
US GPE
Census 2010 ORG

Category: Management & Governance
Named Entities:
ETL ORG
Talend Big Data ORG
Qlik Mobile ORG
RFID ORG
CloudHealth Technologies ORG
CloudHealth ORG
VMWare ORG
Dragon PERSON
five CARDINAL
Rev-Trac ORG
one CARDINAL
Rev-Trac ORG
SAP ORG

Rev-Trac Platinum ORG
SAP ORG
DevOps ORG
AirWatch Container ORG
Android ORG
VMware AirWatch ORG
Jamf Pro PERSON
Apple ORG
macOS PERSON
The Keylight Platform WORK_OF_ART
Enablon North America Corp. ORG
Environmental Health and Safety ORG
Enablon PRODUCT
RF ORG
QXDM Professional ORG
VAR - Suite ORG
Atlassian NORP
Jira Software PERSON
kanban ORG
Atlassian Corporation ORG
Jira PERSON
Atlassian Stack PERSON
Atlassians NORP
Atlassian NORP
The Atlassian Stack PERSON
Data Center ORG
Bitbucket, JIRA Service Desk ORG
Jira PERSON
Jira PERSON
Four CARDINAL
Jira PERSON
Jira Software PERSON
Jira Service Desk PERSON
Jira Ops PERSON
Jira Core PERSON
Jira PERSON
Atlassian NORP
Project/Resource ORG
Centercode ORG
RSP ORG
AppFlash ORG
10 CARDINAL
AppFlash ORG
one CARDINAL
Company ORG
Deque Systems ORG
LexisNexis ORG
Bridger Insight  XG WORK_OF_ART

KYC ORG
PPM ORG
PPM ORG
PPM ORG
Portfolio Management ORG
more than 8,000 CARDINAL
ALM/Quality Center ORG
Micro Focus' Project and Portfolio Management ORG
Program Management ORG
MobileIron Inc. ORG
Mobileiron ORG
Ivanti Oracles Agile Product Lifecycle Management PERSON
Oracle ORG
Agile ORG
PLM ORG
Sitetracker ORG
Sitetracker NORP
one CARDINAL
VMware Workspace ORG
ONE CARDINAL
VMWare ORG
Broadcom BeyondTrust Remote Support ORG
Bomgar PERSON
BDNA Normalize ORG
BDNA Technopedia ORG
Centralized Asset Transactional Services ORG
Asset Lifecycle Management Software ORG
Fulcrum Technologies Marimba Client ORG
Server Management ORG
The Endpoint Management Platform
BigFix ORG
BigFix PERSON
Micro Focus Operations Bridge ORG
OpsBridge ORG
Discovery PRODUCT
Software Center Configuration ORG
Windows NORP
Solution Automates Management of Assets ORG
Power, Energy, & Workflows ORG
Data Center Infrastructure Management ORG
Nektar PERSON
IoT ORG
AI ORG
Yardi Voyager PERSON
Forum Analytics PERSON
SIMMS PERSON
OfficeSpace Software ORG
OfficeSpace ORG

Jellyfish NORP
Jellyfish NORP
Jira PERSON
GitHub ORG
day DATE
The Vendor Risk Management ORG
GRC ORG
The IBM TRIRIGA Application Platform ORG
IBM ORG
IBM ORG
the Administrator Console ORG
Document Manager PERSON
IBM ORG
Data Center Infrastructure Management ORG
Excel PRODUCT
Visio PERSON
Data Center Ops, Facilities ORG
InstallShield ORG
InstallShield ORG
Microsoft Windows ORG
Identify ORG
Multicloud NAC PERSON
zero CARDINAL
Kubernetes ORG
Aisera's AI Copilot ORG
Aisera ORG
F-Response PRODUCT
One CARDINAL
F-Response PRODUCT
SSH ORG
RDS ORG
F-Response PRODUCT
Physical Disks
Logical Volumes
Physical Memory WORK_OF_ART
RAM ORG
Cloud Servers PERSON
Network Attached Storage PERSON
F-Response PRODUCT
Chromebooks ORG
DynamicPolicy ORG
DynamicPolicy ORG
IBM ORG
OpenPages PRODUCT
DevOps ORG
Non Prod ORG
OT ORG
JAWS ORG

Speech ORG
JAWS ORG
Braille GPE
ZoomText Magnifier/Reader ORG
Magnifier/Reader ORG
one CARDINAL
ZoomText PRODUCT
JAWS ORG
Apple ORG
one-year DATE
the ninety days DATE
AppleCare ORG
Rescue ORG

Category: Digital Workplace
Named Entities:
Citrix Workspace PERSON
Virtual Apps PERSON
apps PERSON
browser apps PERSON
Virtual Apps PERSON
every day DATE
Jive Software PERSON
networking'software ORG
Palo Alto GPE
California GPE
the Jive Social Business Platform ORG
Slack GPE
Microsoft Teams ORG
EMS ORG
Google Extension ORG
3 CARDINAL
Webcaster PERSON
over 10,000 CARDINAL
Webcaster PERSON
one CARDINAL
annual DATE
Webcaster PERSON
Cvent Meeting and Event ORG
Suite PERSON
Attendee ORG
Site Selection Tool ORG
Meetings Management Solution Google Chromebox ORG
Webex Meetings ORG
G Suite PERSON
Google WorkSpace ORG
Google ORG

HCL Connections is'social ORG
Moxtra PERSON
SurgeMail ORG
today DATE
thousands CARDINAL
hundreds of thousands CARDINAL
Oracle WebCenter ORG
Oracle WebCenter ORG
Slack PERSON
American NORP
Slack Technologies ORG
IRC ORG
Slack PERSON
2021 DATE
Smartsheet Inc. ORG
Snagit PERSON
SAP ORG
Excel PRODUCT
Excel PRODUCT
BrightTALK is'a ORG
Brightidea PERSON
Brightidea PERSON
Adobe Connect ORG
Adobe Connect ORG
MGSC ORG
ALL ORG
up to 100 CARDINAL
Adobe Connect PERSON
Cloud Communications ORG
NTT ORG
ENGAGEMENT ORG
OUR HOME BASED TEAM (HBA ORG
ProPlus ORG
Microsoft Office ORG
up to 5 CARDINAL
Macs PERSON
2019 DATE
Access, Excel ORG
OneNote ORG
Outlook PERSON
PowerPoint ORG
Word PERSON
Skype for Business Microsoft ORG
Word PERSON
Excel PRODUCT
PowerPoint ORG
Microsoft ORG
ProPlus ORG

Microsoft Office ORG
Lucidchart ORG
Diagram ORG
CorasWorks ORG
BI ORG
Sharepoint ORG
Microsoft SharePoint ORG
Fastest ORG
Easiest LOC
Business Value ORG
SharePoint ORG
CorasWorks PERSON
IM ORG
Real-Time ORG
VoIP LOC
White Boards ORG
HCL Domino PERSON
Notes PRODUCT
The Boardwalk Application Engine ORG
BAE ORG
Blockchain PERSON
BAE ORG
apps ORG
apps ORG
Automates NORP
Excel PRODUCT
Boardwalk ORG
one CARDINAL
Smart Package Studio ORG
Smart Package Studio ORG
Windows GPE
Linux GPE
macOS PERSON
Android PERSON
Adobe Acrobat Standard PERSON
PDF ORG
PDF ORG
Pro NORP
PDF ORG
Autodesk PERSON
Visio PERSON
PDF ORG
Slack, Microsoft Teams ORG
Zoom Apps PERSON
Lucidspark ORG
Microsoft ORG
Microsoft ORG
Microsoft ORG

Standard ORG
Office ORG
Office Standard ORG
Microsoft Project ORG
Microsoft ORG
SharePoint ORG
Microsoft Office ORG
2001 DATE
SharePoint ORG
Microsoft Software Assurance ORG
Microsoft ORG
Microsoft Windows ORG
Microsoft Office ORG
Microsoft ORG
install apps PERSON
2.0 CARDINAL
UML ORG
Standard ORG
Multicloud NAC PERSON
zero CARDINAL
Google Premium ORG
IP ORG
Jabber PERSON
UC GPE
TruExperience ORG
Gulf Coast DevOps, Inc. ORG
GCDO ORG
Easily ORG
Empower PERSON
first ORDINAL
Empower PRODUCT
Gantt PERSON
appspace.com/cisco GPE
Webex Devices ORG
The Google Sheets ODBC Driver ORG
Google Spreadsheets ORG
ODBC ORG
ODBC ORG
VSD Viewer ORG
Visio PERSON
VSD Viewer ORG
Mac PERSON
ShareFile ORG
Citrix/CSG WORK_OF_ART

Category: IT Infrastructure Software Services
Named Entities:

Virtual Apps PERSON
3 CARDINAL
GUI ORG
IDE & client ORG
Windows, Mac ORG
Linux PERSON
API's ORG
Query ORG
S3 CARDINAL
SQL Amazon Simple Workflow ORG
Amazon SWF ORG
IBM Informix ORG
SQL ORG
NoSQL, JSON GPE
Ansible PRODUCT
Microsoft Windows ORG
OpenStack Object Storage ORG
Kubernetes ORG
DevOps ORG
Create ORG
Amazon Systems ORG
Windows NORP
Linux GPE
Amazon ORG
Windows File Server ORG
Chef and Puppet AWS Step Functions ORG
ML ORG
AWS ORG
The AWS Well-Architected Tool WORK_OF_ART
IBM ORG
AI ORG
Analyzer PERSON
Data Center Automation Software & Tools ORG
Genesys Engage PERSON
Genesys Engage PERSON
Genesys Cloud PERSON
Hitachi Managed Services Infrastructure ORG
850 CARDINAL
819 CARDINAL
Virtual ORG
OpenStack WORK_OF_ART
OpenStack ORG
SAP Cloud Platform Integration PERSON
SAP ORG
third ORDINAL
SAP Cloud Platform Integration Suite ORG
Microsoft ORG
SQL Server PERSON

Microsoft ORG
Operations Management Suite ORG
OMS ORG
one CARDINAL
OMS ORG
Azure GPE
OMS ORG
one CARDINAL
NoSQL GPE
the Server Side Public License ORG
Microsoft ORG
File Systems ORG
Nvidia Grid ORG
Cumulus Linux Spine Windows Server PERSON
2019 DATE
Windows Server ORG
Microsoft ORG
Windows NT LOC
Microsoft ORG
InfluxDB ORG
InfluxData ORG
AppOps ORG
DevOps) Release PRODUCT
first ORDINAL
CPQ ORG
Subscription Billing ORG
B2B Commerce and Field Service Lightning ORG
Salesforce GPE
metadata PERSON
AppOps Release PRODUCT
Amazon Web Services ORG
AWS ORG
DC/OS ORG
Apache Mesos PRODUCT
DC/OS ORG
Google BigQuery Service ORG
Cloud Bigtable PERSON
Google Cloud PERSON
Cloud Dataflow PERSON
Cloud Datalab PERSON
Cloud Dataproc PERSON
Cloud Datastore PERSON
Cloud Endpoints PERSON
Cloud Functions PERSON
Google Cloud Key Management ORG
Google Cloud ML PERSON
Cloud Spanner PERSON
Google Cloud SQL PERSON

Cloud Storage PERSON
Google Compute Engine ORG
Google Container Engine ORG
NoSQL GPE
Java PERSON
Multi GPE
Soleo ORG
Cloud Platform PERSON
GCP ORG
Google ORG
JM Software Services ORG
US GPE
LiveSource ORG
Confluent PERSON
Kafka PERSON
Kafka PERSON
Kafka PERSON
the Data Definition Language LAW
DDL ORG
healthcare ORG
PO ORG
U.S. Communication ORG
Managed Services ORG
GoGo ORG
Gogo Inc. ORG
Public License PERSON
the Advanced Edition ORG
Virtual Apps PERSON
two CARDINAL
Ingram Micro ORG
thousands CARDINAL
Neo4j PERSON
ACID ORG
Airlinq NORP
GlobeTouch ORG
SIM ORG
Soft SIM PERSON
SIM ORG
3rd ORDINAL
tens of thousands CARDINAL
Microsoft ORG
3rd ORDINAL
Microsoft ORG
M2M PERSON
Linux GPE
AOS ORG
IoT ORG
IoT Edge Server ORG

AOS ORG
5 CARDINAL
G / 4G LTE ORG
AMI ORG
Distribution Monitoring ORG
DM&C ORG
WiMacTel ORG
North American Telecommunications and Full Service Call Centre ORG
Spanish Directory Assistance (DA WORK_OF_ART
Portworx PERSON
Sevis Systems PERSON
Sevis PERSON
Sevis PERSON
Amazon Web Services ORG
AWS ORG
AWS Database Migration Service ORG
DMS ORG
Amazon Relational Database Service ORG
RDS ORG
Amazon ORG
NoSQL GPE
Amazon Web Services ORG
Amazon Elastic Container Registry ORG
Amazon ORG
AWS ORG
Amazon Elastic Container Service ORG
Amazon ECS ORG
AWS Amazon EKS ORG
Kubernetes LOC
Kubernetes ORG
AWS ORG
Amazon Kinesis ORG
Amazon Kinesis ORG
IoT ORG
Lambda NORP
over 200 CARDINAL
Amazon Neptune ORG
The AWS Health Dashboard ORG
MySQL, PostgreSQL GPE
Oracle ORG
SQL Server PERSON
Amazon ORG
S3 PRODUCT
Amazon Simple Storage Service ORG
Amazon Web Services ORG
Amazon SNS ORG
SMS ORG
Snowball PERSON

petabyte NORP
AWS ORG
Apache Cassandra PERSON
NoSQL GPE
Kafka PERSON
BMC ORG
DB2 & AMI ORG
CMF Product ORG
BMC ORG
IBM Information Management System ORG
CA 1 Tape Management ORG
CA Directory PERSON
X500 CARDINAL
Endevor PERSON
Endevor PERSON
CA Mainframe PERSON
Utilities CA Remote Control EVENT
CA Vantage Storage Resource FAC
CA Vantage ORG
Cisco SMARTnet Service ORG
Technical Assistance Center ORG
TAC ORG
MR-Win6530 DATE
Microsoft Windows ORG
HPE NonStop ORG
IBM ORG
UNIX ORG
Commvault Backup & Recovery ORG
DASD ORG
DASD ORG
WinZip ORG
Microsoft Windows ORG
macOS PERSON
Android Crunchy Certified PostgreSQL PERSON
DataStax PRODUCT
Apache Cassandra PERSON
DataStax, Inc. ORG
Santa Clara GPE
California GPE
one CARDINAL
DataStax ORG
Apache Cassandra PERSON
Delphix Engine ORG
Druva GPE
Gluent Offload Engine ORG
Apigee ORG
Apigee ORG
Hitachi ORG

Blueworx Voice ORG
minutes TIME
Blueworx PERSON
CICS PERSON
Customer Information Control System ORG
IBM ORG
IBM ORG
IBM ORG
IBM ORG
Sterling Connect:Direct ORG
FTP ORG
IBM ORG
AI ORG
Warehouse ORG
BIG SQL ORG
Performance Management ORG
Optim PERSON
Cloud Pak PERSON
IBM ORG
Microsoft Windows ORG
UNIX ORG
Linux GPE
IBM ORG
IBM ORG
Parallel File System ORG
GPFS ORG
SAN ORG
SAN ORG
IMS Library Integrity Utilities ORG
IMS GPE
Analyzer PERSON
IBM ORG
SQL ORG
NoSQL, JSON GPE
Informix ORG
the Storage Optimization ORG
Informix ORG
IBM ORG
InfoSphere ORG
to'replicate ORG
The JBoss Enterprise Application ORG
JBoss EAP ORG
Java PERSON
Java applications'and ORG
Red Hat ORG
JBoss Web Server PERSON
Java PERSON
NEED ORG

DESCRIPTION Kyndryl PERSON
IBM ORG
Service ORG
IBM ORG
Red Hat ORG
Standard ORG
Standard ORG
Red Hat Satellite ORG
Red Hat ORG
Linux PERSON
Red Hat ORG
NEED ORG
DESCRIPTION IBM ORG
the IBM Software Defined Storage ORG
up to 40 percent PERCENT
Spectrum Protect ORG
Spectrum Archive ORG
Cloud Obj Storage PERSON
Spectrum Discover ORG
Spectrum Scale PERSON
IBM Spectrum Symphony ORG
dozens CARDINAL
IBM ORG
WebSphere Application Server ORG
Java PERSON
WebSphere Application Server ORG
InfiniGuard ORG
InfiniBox ORG
ODM ORG
Host PowerTools ORG
Innovation Data Processing ORG
Little Falls PERSON
NJ ORG
FDR PERSON
ABR ORG
FDRPAS ORG
FASTCPK ORG
FDRSOS DATE
FDR PERSON
FATS/FATAR ORG
IAM ORG
Innovation Data Processing ORG
Little Falls PERSON
NJ ORG
FDR PERSON
ABR ORG
FDRPAS ORG
FASTCPK ORG

FDRSOS DATE
FDR PERSON
FATS/FATAR ORG
IAM ORG
Liaison Technologies, Inc. ORG
MacKinney Batch PERSON
CICS PERSON
CICS PERSON
Customer Information Control System ORG
MacKinney Batch ORG
CICS PERSON
CICS ORG
CICS ORG
SQL ORG
Hybrid Cloud Management ORG
HCM ORG
HCM ORG
HCM ORG
DevOps ORG
Micro Focus Connect-It ORG
Micro Focus'Connect ORG
Micro Focus' Data Center Automation ORG
Storage Resource Management ORG
Focus Storage ORG
HP Storage Operations ORG
SAN ORG
NAS ORG
UCMDB ORG
Micro ORG
a Configuration Management Database ORG
Access License PERSON
Microsoft ORG
CAL Suite PERSON
four CARDINAL
Microsoft ORG
the Microsoft Windows ORG
Microsoft Office ORG
Microsoft ORG
SQL Server PERSON
Microsoft ORG
the Windows Pro License ORG
Windows Enterprise License ORG
Windows Enterprise ORG
Windows ORG
Bitlocker Mgmt PERSON
App Locker PERSON
Device Guard ORG
Credential Guard ORG

Telemetry LOC
Off PERSON
Remote Desktop Services ORG
Terminal Services ORG
Windows Server PERSON
2008 DATE
Microsoft Windows ORG
Windows 10 PRODUCT
Microsoft ORG
Windows Server PERSON
2019 DATE
Datacenter PERSON
one CARDINAL
Windows Server ORG
DataPower Buddy PRODUCT
DPBuddy ORG
IBM DataPower Gateways ORG
log management/collection ORG
FlexShare ORG
the ONTAP Essentials for FAS2220 ORG
WORM ORG
NFS ORG
VDI ORG
Managed Services ORG
Softwares Drivers PERSON
Connectors ORG
ODBC ORG
JDBC PERSON
ADO.NET Drivers ORG
ODBC ORG
ODBC ORG
32- CARDINAL
64 CARDINAL
JDBC PERSON
Cisco Unified Contact Center Enterprise ORG
UCCE ORG
Cisco Contact Center ORG
Data Guard ORG
one CARDINAL
Oracle PERSON
Oracle RAC ORG
Oracle RAC ORG
Oracle GoldenGate ORG
one CARDINAL
Oracle MySQL ORG
Oracle Cloud ORG
Oracle Corporation ORG
Oracle Corporation ORG

Oracle ORG
Oracle and Tekelec's ORG
Oracle Database ORG
Oracle Corporation ORG
Solaris PERSON
Oracle Spatial ORG
Graph ORG
Oracle Database ORG
Oracle Spatial ORG
Graph ORG
Oracle NORP
Oracle TimesTen In-Memory Database ORG
WebLogic Server ORG
WebLogic Server ORG
Percona Server ORG
Percona GPE
Percona Server PERSON
Oracle MySQL ORG
MQ Telemetry Transport ORG
PKZIP ORG
Entity Framework ORG
LinqConnect ORG
SQL ORG
Apache Hive PERSON
Apache Hadoop ORG
SQL ORG
Hadoop Puppet ORG
Linux GPE
Windows GPE
Puppet ORG
IBM ORG
Cisco GPE
Mac PERSON
Evergreen ORG
Pure PERSON
SharePlex ORG
Oracle ORG
Oracle NORP
SQL Server Enterprise ORG
SQL Server ORG
Quest Software ORG
SQL Redis PERSON
BSD ORG
NoSQL GPE
TLicenses ORG
Video On Demand ORG
UI Rewrite ORG
NoSQL GPE

Redis GPE
linear ORG
hundreds of millions MONEY
Active-Active geo-replication ORG
Flash PERSON
five CARDINAL
99.999% PERCENT
Rocket® Terminal ORG
Rocket Terminal Emulator ORG
Web Edition WORK_OF_ART
Rocket Mainstar PERSON
Catalog Recovery Plus PERSON
ICF ORG
Rocket Ensure ORG
SEEBURGER Business Integration Suite ORG
BIS ORG
BIS ORG
API/EAI- Connect ORG
B2B/EDI-Industry ORG
IoT/Industry 4.0- Integrate ORG
ERP ORG
ERP ORG
SAP Integration SnapLogics'intelligent ORG
Adabas PERSON
Linux GPE
Windows ORG
Charon-VAX PERSON
VAX PRODUCT
Windows ORG
Charon-VAX PRODUCT
VAX PRODUCT
VAX/VMS PRODUCT
SUSE Linux PERSON
SUSE ORG
Linux PERSON
IBM ORG
Saver Suite PERSON
Syncsort ORG
Syncsort ORG
the 1970s DATE
IBM ORG
TAA Productivity Tools'is ORG
IBM ORG
TOPCOM Licensed Software PERSON
Ericsson GPE
TCIP ORG
IP ORG
Transaction Oriented Protocol LAW

Teradata Corp. ORG
TIBCO Enterprise Message Service ORG
SOA ORG
Java Message Service ORG
TN3270 Plus PRODUCT
3270 CARDINAL
TN3270 Plus PRODUCT
Telnet ORG
Windows NORP
IBM ORG
Veeam Backup & Replication ORG
VMware vSphere ORG
Nutanix AHV PERSON
Microsoft ORG
NetBackup ORG
Windows GPE
Linux GPE
UNIX ORG
Linux PERSON
Softbank ORG
vCenter Server PERSON
VMware ORG
VMware vMotion ORG
vCenter ORG
Windows NORP
Linux GPE
Wowza PERSON
millions CARDINAL
Portworx PERSON
Kubernetes ORG
ThingSpace Core All Verticals M2MMC Azure ORG
Microsoft ORG
Microsoft ORG
Charon ORG
Alpha PRODUCT
Windows NORP
Linux GPE
DEC ORG
Alpha GPE
Bacula PERSON
Cloud Elements PERSON
API ORG
four CARDINAL
Rackspace PERSON
Amazon Web Services ORG
Microsoft ORG
OpenStack ORG
TileDB PERSON

TileDB PERSON
Druva EndPoint PERSON
SAP ORG
SAP ORG
ERP ORG
Systems Applications and Products in Data Processing WORK_OF_ART
ERP ORG
Hana Enterprise Cloud ORG
SharePoint ORG
SharePoint ORG
SharePoint ORG
Microsoft Office ORG
Merrill`s Expanded Guide PERSON
Statistical Analysis System ORG
SAS ORG
the System Management Facility ORG
Cloud Edition PERSON
ECE ORG
The American Registry for Internet Numbers ORG
ARIN ORG
IP ORG
North American Internet Service Providers ORG
US GPE
Canada GPE
Antarctica LOC
Caribbean LOC
CapStorm ORG
Assure, Enable ORG
Govern your Salesforce ORG
GCP ORG
Shredding Service HVR ORG
HVR ORG
HVR ORG
Fivetran PERSON
Gisual PERSON
NonStop OS ORG
CPU ORG
IBM ORG
MQ ORG
Automate GPE
3rd ORDINAL
Veeam Management Pack ORG
System Center ORG
VMware vSphere ORG
Microsoft ORG
Veeam Backup & Replication Reflection for Secure Information Technology ORG
a Secure Shell ORG
SSH ORG

UNIX ORG
Windows ORG
The Core Infrastructure Server Suites ORG
the Windows Server ORG
Microsoft System Center ORG
Microsoft ORG
Client GPE
Nutanix AOS PERSON
HCI NORP
AOS ORG
AOS Pro PERSON
one CARDINAL
AOS ORG
HTML5 ORG
NetOps Console Servers ORG
Lighthouse ORG
Docker PERSON
Oracle Cloud Infrastructure ORG
OCI GPE
SAP Advanced Data Migration and Management by Syniti ORG
Apache Subversion PRODUCT
Windows ORG
first ORDINAL
Active Directory ORG
VMware Horizon ORG
VMware, Inc for Microsoft Windows ORG
Linux GPE
macOS PERSON
Avaya Aura Platform PERSON
Rapid Recovery PERSON
apps ORG
zero CARDINAL
Avaya PERSON
IR ORG
Avaya DevConnect Technology Partner ORG
The Prognosis for Unified Communications Solution ORG
Prognosis ORG
BMC Compuware ThruPut ORG
BMC Compuware ThruPut ORG
monthly DATE
MLC ORG
HostExplorer ORG
Windows NORP
IBM ORG
IBM ORG
VT GPE
Windows NORP
Archive Per Base Transaction ORG

TLS ORG
Couchbase Server PERSON
Membase ORG
NoSQL PRODUCT
Couchbase Server PERSON
Membase ORG
NoSQL PRODUCT
SQL ORG
Navicat for PostgreSQL ORG
Amazon Redshift ORG
Amazon Aurora PERSON
Amazon RDS ORG
Google Cloud PERSON
Microsoft Azure ORG
Firebird PERSON
ANSI ORG
Linux GPE
Windows GPE
Firebird PERSON
1981 DATE
Apache PRODUCT
NoSQL GPE
Erlang GPE
JavaScript ORG
MapReduce ORG
HTTP ORG
API ORG
Riak KV PERSON
LevelDB PERSON
GitHub ORG
the New BSD License ORG
macOS PERSON
Windows ORG
Android ORG
Aerospike Database PERSON
NoSQL GPE
Aerospike ORG
The Twilio Programmable Voice API ORG
Interactive Voice Response ORG
IVR ORG
Integrated Computer Forensics Software ORG
X-Ways Forensics ORG
Vista/2008/7/8/8.1/2012/10/2016/2019/11 GPE
32 Bit/64 Bit PERCENT
PE/FE ORG
Windows, Mac ORG
Linux PERSON
Access 2021 WORK_OF_ART

seconds TIME
Access ORG
Aruba GPE
the Aruba Central Foundation ORG
Advanced Licenses ORG
Aruba Central Licenses ORG
Access Points ORG
Foundation ORG
Device Management ORG
the Foundation License ORG
AI Insights ORG
WLAN ORG
Reseller ORG
KLR TECHNOLOGY LLC Fusion Pro ORG
Kubernetes ORG
Key Features LOC
Kubernetes Clusters ORG
Intel ORG
Apple Silicon Macs
 PERSON
macOS 13 DATE
Ventura GPE
Intel ORG
Apple Silicon Macs
 PERSON
Intel ORG
Apple Silicon
Connect ORG
vSphere ORG
Oracle Communications Converged Application Server ORG
Java PERSON
The Converged Application Server ORG
Oracle ORG
Java EE-compliant PERSON
WebLogic ORG
Server PRODUCT
The TIBCO Cloud  Integration ORG
Komprise ORG
Komprise ORG
Charon-PAR ORG
Linux PERSON
Intel ORG
Intel ORG
one CARDINAL
two CARDINAL
Linux PERSON
7.x ORG
VMware ORG

one CARDINAL
two CARDINAL
Linux PERSON
Charon ORG
third ORDINAL
Charon ORG
MPE ORG
HP-UX ORG
Charon-PAR ORG
MPE ORG
EDI ORG
EDI ORG
Electronic Data Interchange ORG
EDI ORG
VMware NSX ORG
IBM ORG
API ORG
IBM ORG
IBM ORG
SQL PERSON
Microsoft ORG
SQL Server PERSON
Oracle, Sybase Adaptive Server ORG
IBM ORG
Linux GPE
Windows ORG
IBM ORG
SQL PERSON
SQL PERSON
Embarcadero Hammer CallMaster PERSON
weeks DATE
days DATE
hours TIME
Empririx ORG
Infovista GPE
Hammer PERSON
Hammer
Empirix ORG
Hammer PERSON
Salesforce Data ORG
StreamNative Supported ORG
Apache Pulsar PERSON
less than 10ms CARDINAL
hundreds CARDINAL
six CARDINAL
up to one million CARDINAL
IBM ORG
UNIX ORG

Linux PERSON
TCP/IP
Extra! ORG
2000 DATE
Parallels Desktop PERSON
Windows GPE
Linux GPE
Mac PERSON
Mac PERSON
SQL Server ORG
SQL Toolbelt Essentials ORG
SQL Server ORG
SQL ORG
PDQ ORG
PDQ Inventory ORG
PDQ ORG

Category: Marketing Management
Named Entities:
360 CARDINAL
360 CARDINAL
360 CARDINAL
apps ORG
Prospect ORG
H/W ORG
Prospect ORG
H/W ORG
Swrve PERSON
over millions CARDINAL
CMS ORG
WYSIWYG ORG
Glassbox PERSON
journeys - Tealium PERSON
Tag Management ORG
Supplier ORG
Universal Data Hub ORG
IoT ORG
IoT ORG
one CARDINAL
Tealium AudienceStream ORG
Supplier ORG
Amazon ORG
S3 PRODUCT
Supplier ORG
Amazon ORG
S3 PRODUCT
Real-Time TV Attribution Services: TV Measurement, TV Attribution ORG

Intercom ORG
ObservePoint ORG
ObservePoint ORG
ObservePoint ORG
ObservePoint ORG
WebAssurance ORG
ObservePoint ORG
Test PERSON
AppAssurance ORG
third ORDINAL
SDK ORG
SDK ORG
Forrester ORG
Kaon Interactive PERSON
Kaon PERSON
ONCE ORG
App Use PERSON
Company NORP
millions CARDINAL
42 CARDINAL
one CARDINAL
billions CARDINAL
every month DATE
Return Path PERSON
Validity A ORG
Cloud PERSON
Customer Journey Analytics - Customer Journey Analytics PERSON
Journey Orchestration - Journey Orchestration ORG
Stack Exchange ORG
AT Data ORG
D&B Integration ORG
Dun & Bradstreet ORG
B2B ORG
NetProspex ORG
Dun & Bradstreet's ORG
D&B ORG
Optimizer PERSON
Dun & Bradstreet ORG
Microsoft ORG
Finance Analytics ORG
D&B Credit Service ORG
Credit Risk Management ORG
Order IGNITIUM  Account-Based Marketing FAC
ABM ORG
weekly DATE
Engagio PERSON
ABM ORG
Winback ORG

2007 DATE
Zeta ORG
Conductor Searchlight PERSON
SEO & Content Marketing ORG
U.S. GPE
The Yext Knowledge WORK_OF_ART
Knowledge Graph Enterprise Social Media Management System ORG
Cloud PERSON
Sprinklr PERSON
Social Media Management System ORG
Cloud PERSON
Employee Social Advocacy Program ORG
Oracle Responsys Campaign Management ORG
Oracle Responsys PERSON
Fios ORG
SMS ORG
Mobile App ORG
Convert PERSON
today DATE
Interamind ORG
Remarkety ORG
D&B ORG
some 315 million CARDINAL
Data-as-a-Service ORG
ZoomInfo ORG
Turbine Labs ORG
third ORDINAL
Contentsquare PERSON
Digital Experience Analytics Platform ORG
CS Digital Starter Packs ORG
CSP ORG
CS Digital ORG
CS Find & Fix ORG
CS Apps ORG
CS Insights ORG
Professional Services ORG
Raw Data Export Delivering ORG
Digital Feedback ORG
GA 360 Suite Service ORG
Google ORG
Attribution 360 ORG
360 CARDINAL
Google Analytics 360 ORG
Google Analytics 360 ORG
Unsampled Reports, BigQuery Export ORG
Data Driven Attribution ORG
one CARDINAL
Qualtrics ORG

Google Analytics 360 ORG
Google Analytics 360 ORG
Unsampled Reports, BigQuery Export ORG
Data Driven Attribution ORG
Zferral, Inc. ORG
Core Platform PERSON
Private & Public Company Data ORG
Industry Analytics ORG
Newsletter ORG
Workflow (Collections ORG
Notes PRODUCT
Stories ORG
Core Intelligence ORG
Design Distributors ORG
One CARDINAL
Continuous Product Design ORG
Combat NORP
CDP ORG
MARS ORG
DSP ORG
Data ORG
SQL ORG
the Experience Platform Application Services ORG
AEP App Svc ORG
Adobe Campaign ORG
Adobe Experience Cloud ORG
Creative Cloud PERSON
linear ORG
Infer PERSON
An Insight Explorer WORK_OF_ART
apps ORG
Experian Data Quality's ORG
D&B ORG
U.S. GPE
eight CARDINAL
SwitchPitch ORG
Fortune 500 PRODUCT
Bango PERSON
Bango PERSON
Feedonomics GPE
Optimizes ORG
hundreds CARDINAL
Syncs LOC
LiveRamp Holdings, Inc. ORG
LiveRamp PRODUCT
Acxiom GPE
2014 DATE
one CARDINAL

SafeGraph ORG
each month DATE
SafeGraph ORG
MTN ORG
quarterly DATE
900 million CARDINAL
daily DATE
CRM PRODUCT
Service Cloud PERSON
CRM PRODUCT
Salesforce CRM Analytics PRODUCT
CRM PRODUCT
CRM Analytics Plus PRODUCT
CRM Analytics Growth PRODUCT
Einstein Discovery for Reports

Includes the Salesforce Einstein Analytics WORK_OF_ART
Salesforce ORG
The Persado Motivation AI Platform ORG
AI ORG
AI ORG
Journey Optizer PERSON
Journey Orchestration ORG
Adobe Journey Optimizer PERSON
first ORDINAL
Journey Orchestration ORG
Platform Application Services ORG
AEP App Svc ORG
Real Time Customer Data ORG
the Experience Platform Application Services ORG
AEP App Svc ORG
Adobe Firefly PERSON
AI ORG
Firefly ORG
Adobe PERSON
Firefly PERSON
AI ORG
Firefly PERSON
Adobe PERSON
Adobe Stock ORG
The US Business Database ORG
PLACES ORG
hours TIME
US GPE
US Verified GPE
Suspect LOC
US GPE
Data Axle ORG

Marketing / Analytics
Technology ORG
UI ORG
Data Axle's ORG
S3 PRODUCT
CRM PRODUCT
Cloud Integrations PERSON

Category: Customer Operational Platforms
Named Entities:
MiCloud Connect PERSON
Google Cloud's ORG
MiCloud Connect PERSON
AI ORG
Insidesales.com ORG
Salesforce.com ORG
Lattice Atlas PERSON
Measure WORK_OF_ART
Lattice Atlas PERSON
360 CARDINAL
1st ORDINAL
Oracle Siebel CRM ORG
SFA ORG
Relationship Management ORG
KPI ORG
Seismic ORG
LLC ORG
Company NORP
the State of California GPE
Precision Demand Marketing ORG
the Integrate Demand Acceleration Platform ORG
GridBuddy ORG
Salesforce CRM PRODUCT
Salesforce UX PERSON
Data Management ORG
CRM PRODUCT
Suite PERSON
DemandTools ORG
GridBuddy ORG
BriteVerify ORG
Google ORG
Gmail PERSON
Salesforce.com ORG
CRM PRODUCT
Gmail PERSON
Salesforce GPE
Gmail PERSON

Google Apps ORG
Salesforce ORG
Google ORG
Google Contacts to Salesforce Provides ORG
Company ORG
TechTarget ORG
ABM ORG
Equip GPE
Train GPE
Coach ORG
LeanData ORG
CRM PRODUCT
LeanData ORG
LeanData ORG
Attribution ORG
Outreach Platform ( PERSON
first ORDINAL
Salesloft ORG
Salesloft ORG
CRM PRODUCT
Whisbi ORG
Sales & Marketing ORG
GridBuddy ORG
Salesforce CRM PRODUCT
Salesforce UX PERSON
Chili Piper ORG
LinkedIn Sales Navigator ORG
LinkedIn GPE
LinkedIn GPE
Microsoft ORG
ABX ORG
ABM ORG
Traction Hierarchies ORG
Salesforce GPE
Leads and Contacts WORK_OF_ART
Maze Runner Salesforce PERSON
CRM PRODUCT
Limitless Online Marketplaces ORG
Commerce ORG
Customised Solutions ORG
Verint NICE IEX Workforce Management ORG
IEX ORG
Customer Service Analytics ORG
FiOS NORP
Appsee ORG
Retail PERSON
Comments ORG
PO ORG

BVA ORG
each month DATE
one CARDINAL
RBM Technologies ORG
Merchandising Cloud PERSON
Software Features ORG
Digital ORG
Cogito PERSON
Impact.com ORG
Radius ORG
Program ORG
Visible PRODUCT
Partner Insights PERSON
Partner ORG
Company ORG
Company's Partners ORG
Company Relationship Management ORG
CRM PRODUCT
Company ORG
Company

Attribution Risk ORG
the Partnership Cloud LOC
API ORG
Visible PRODUCT
SAAS ORG
Matrixx ORG
Google ORG
Network ORG
SDK LAW
Mail Handling Equipment and Services ORG
Khoros PERSON
Spredfast + Lithium ORG
Bazaarvoice ORG
Bazaarvoice ORG
Customer Ratings & Reviews ORG
OEM Connections Consolidate ORG
CRM PRODUCT
Conversational Service Automation ORG
NLP ORG
RPA ORG
CSA ORG
ACW ORG
Pitney Bowes ORG
Maintenance PERSON
over 40 CARDINAL
Bill Print PERSON
TDM ORG

IP ORG
Session Initiated Protocol EVENT
Call Recording (Channel Based ORG
Voice Interaction Recording ORG
Screen Interaction Recording, Encryption Management, Interaction Data Platform
With Verint Quality Management ORG
Automated Quality Management ORG
Quality Management Accelerate New Offering Design ORG
OSM ORG
CRM PRODUCT
Oracle Communications Billing ORG
BRM ORG
BRM ORG
Oracle Communications Billing ORG
BRM ORG
Oracle ORG
monthly DATE
Dynamic Discounting Management ORG
Pipeline ORG
Universal Event ORG
Pipeline ORG
Oracle Communications Batch Rating ORG
Oracle Communications Brand ORG
Oracle Communications Billing ORG
Oracle Communications Interconnect ORG
Batch Rating PERSON
two CARDINAL
Oracle Communications Collections ORG
Oracle Communications Billing ORG
G/L ORG
GUI ORG
Oracle Communications Payment Suspense ORG
Oracle Communications Revenue Assurance ORG
Oracle Communications Billing ORG
Oracle Communications Revenue Assurance ORG
Oracle Communications Payment Suspense ORG
Oracle Communications Web Services ORG
Oracle Communications Billing ORG
The Oracle Communications Web Services ORG
HTTP ORG
the Oracle Communications Billing and Revenue Management JCA Resource Adapter
ORG
Oracle Communications Billing ORG
Oracle Communications Enterprise Application Integration ORG
Oracle Communications Billing ORG
The Oracle Communications EAI ORG
Oracle Release Management ORG
Oracle Release Management ORG

Oracle Communications Payment ORG
Paymentech ORG
Paymentech ORG
third ORDINAL
Canada GPE
United States GPE
Europe LOC
Oracle Communications Taxation ORG
Vertex ORG
Vertex GPE
third ORDINAL
TouchCommerce ORG
BSS ORG
TouchCommerce ORG
Includes Services for On Premise FreeSpeech VoCon  Hybrid ORG
SDK ORG
Nuance Recognizer PERSON
AI ORG
Sia GPE
AI ORG
Nuance Recognizer PERSON
AI ORG
more than 100 million CARDINAL
Nuance Communications ORG
third ORDINAL
AI ORG
Security Suite ORG
Nuance WORK_OF_ART
ConversationPrint ORG
Omni-Channel Customer ORG
Nuance WORK_OF_ART
ShopperTrak ORG
Software PERSON
Medallia GPE
Identify Causes & Outcomes ORG
Observing Cross-Channel Brand Interactions ORG
Reporting & analytical ORG
Cresta Chatbot PERSON
100% PERCENT
Build PERSON
Cresta ORG
NLU ORG
Conversation Design Experts Industry ORG
Zuora PERSON
Zuora PERSON
NICE Interactive Voice Response Optimization ORG
Interactive Voice Response Analytics ORG
Artificial Intelligence ORG

IVR ORG
8.0 CARDINAL
AI ORG
LLC ORG
American NORP
Flixster PERSON
Movies.com ORG
Rotten Tomatoes PERSON
Flixster PERSON
Rotten Tomatoes PERSON
Fandango ORG
Flixster PERSON
CX ORG
RPA ORG
DDD & QA ORG
Medallia GPE
Qualtrics XM ORG
& manage & ORG
-Asingle ORG
Amplitude PERSON
50 CARDINAL
Monthly DATE
UK GPE
EMEA Advanced eCommerce ORG
Magento ORG
PHP GPE
Magento ORG
Adobe Commerce ORG
2022 DATE
one CARDINAL
Aceyus VUE PERSON
the Visionary User Experience WORK_OF_ART
Aceyus ORG
Aceyus'VUE ORG
Amdocs ORG
AmdocsONE ORG
Amdocs ORG
CatalogONE PERSON
BSS ORG
OSS ORG
Amdocs ORG
third ORDINAL
hundreds CARDINAL
IME ORG
Intec NORP
BSS/OSS ORG
Agile ORG
DevOps ORG

CI ORG
QA ORG
DDD & QA ORG
Virtual PERSON
Lifelike PERSON
AI ORG
Google ORG
AI ORG
One CARDINAL
STERLING ORG
CPQ ORG
one CARDINAL
LiveEngage ORG
the Conversational Cloud FAC
Each month DATE
NECA ORG
the Federal Communications ORG
NECA ORG
Data Rater Software License Maintenance and Services ORG
Commerce ORG
JavaBeans NORP
Ericsson Order Care PERSON
Verifone Connect ORG
PSTN ORG
their work days DATE
Speechmatics PERSON
Personalize GPE
Coveo PERSON
360 CARDINAL
Websites, Ecommerce, Service ORG
Satmetrix PERSON
RFID ORG
Alchemer PERSON
Nexidia ORG
AI ORG
The Oracle Communications Order ORG
BSS (Business Support Systems ORG
BSS ORG
Siebel Customer Relationship Management ORG
CRM PRODUCT
Oracle Communications Order and Service Management ORG
Oracle Communications Billing ORG
Management Freshdesk PERSON
Dragon ORG
five CARDINAL
CCAI ORG
Google Cloud PERSON
Verint Speech Analytics WORK_OF_ART

100% PERCENT
Speech Analytics ORG
Singleview ORG
TruNumber ORG
one CARDINAL
TruNumber ORG
Categorizing FDR PERSON
UC GPE
The Local Time App ORG
Local Time Custom Field PERSON
Salesforce Add-On PERSON
Salesforce GPE
1 CARDINAL
2 CARDINAL
Territories LOC
3 CARDINAL
4 CARDINAL
Verint Premium Plus Support PRODUCT
Verint Support PRODUCT
Quote ORG
Product Catalog PERSON
Support PERSON
Digital Sales ORG
Communications Digital Service ORG
Digital Promotions & Discounts ORG
Billing Inquiry ORG
Communications Base PERSON
Communications Promotions & Discounts ORG
Configure ORG
Quote Nuance Conversational IVR ORG
Informatica Data Privacy Management ORG
CAS ORG
The Centers for Medicare ORG
Medicaid Services ORG
CMS ORG
Operations ORG
Technicians NORP
MCE ORG
4PLS DATE
MCE ORG
the Affordable Connectivity Program Enables ORG
Category Mgt Software PERSON
Wal-Mart Space Planning ORG
KPI ORG
HumanFirst ORG
AI ORG
CX ORG
Aileen CARDINAL

one CARDINAL
HCL Commerce ORG
HCL Commerce ORG
CXone ORG
the first day DATE
Personalized Community ORG
CEAT ORG
AirAsia GPE
BigCommerce ORG
Order Management ORG
OSM ORG
10419 DATE
HCL Digital ORG
IBM ORG
WebSphere Portal PRODUCT
IBM ORG
50 CARDINAL
NUC ORG
Unified Communications ORG
Cisco Webex Contact Center ORG
Webex Contact Center WORK_OF_ART
Cisco Webex Contact Center Enterprise ORG
Webex Contact Center Enterprise WORK_OF_ART
Cisco GPE
Unified Contact Center Enterprise ORG
UCCE ORG
Packaged Contact Center Enterprise ORG
Unified Contact Center Express ORG
UCCX ORG
Software NORP
UCCE ORG
PCCE ORG
Center ORG
UCCE ORG
second ORDINAL
UCCX ORG
Identify ORG
Combine PERSON
Verint Text Analytics PERSON

Category: Enterprise Platforms
Named Entities:
Atlassian Corporation ORG
Jira PERSON
Atlassian Stack PERSON
Atlassian NORP
Atlassian NORP

The Atlassian Stack PERSON
Data Center ORG
Bitbucket, JIRA Service Desk ORG
FME Server ORG
hundreds CARDINAL
AWA ORG
Amazon CloudFront ORG
CDN ORG
The Micro Focus Service Management Automation Suite ORG
ITSM ORG
Oracle BPM Suite ORG
CESI ORG
Ramp Holding ORG
VBrick SAP Integrated Business Planning ORG
IBP ORG
SAP Fieldglass ORG
VMS ORG
Exception Correction - One ORG
NetSuite ORG
NetSuite ORG
ERP ORG
CRM PRODUCT
Oracle Business Intelligence ORG
BI ORG
Oracle Fusion Cloud ORG
PeopleSoft ORG
JD Edwards PERSON
third ORDINAL
Oracle BI Applications ORG
the Oracle BI Foundation ORG
BI ORG
Oracle Self-Service E-Billing On Demand ORG
AI Sourcing ORG
45 CARDINAL
Workspace Provisioning & Management ORG
Milan GPE
IRM ORG
SharePoint ORG
iManage ORG
Concur Travel ORG
Expense ORG
SAP Engagement ORG
Pega Training Digitalsmiths Corporation ORG
Company NORP
metadata PERSON
Digitalsmiths CARDINAL
Allego PERSON
first ORDINAL

90% PERCENT
SaaS Cloud Commission Mgt ORG
Wireline PERSON
SAP Commissions ORG
Vertex ORG
SAP ERP ORG
GeoCoder Master ORG
60 CARDINAL
Vertex GPE
Address Cleansing Service ORG
Vertex GPE
monthly DATE
the United States GPE
Canada GPE
Windows technology Vertex Consulting ORG
Ariba ORG
SAP Ariba ORG
one CARDINAL
Qualcomm Technologies, Inc. ORG
QTI ORG
QTI ORG
ASIC ORG
FIS AvantGard Treasury ORG
Firststrike GPE
Spanish NORP
Wireless ORG
Customer Service Management ORG
ServiceNow ORG
IntegrationHub ORG
one CARDINAL
License, Customer Service Management CSM Users ORG
125 CARDINAL
2021 DATE
VBG ORG
Sol-Int Arch Innov PERSON
Logistyx Technologies ORG
Logistyx Reporting/Analytical Tool MediaValet ORG
DAM ORG
four CARDINAL
one CARDINAL
AI ORG
one CARDINAL
Automated Document & Remittance Processing Software Suite ORG
year DATE
GL ORG
hourly TIME
hourly TIME
Exemption Certificate Software ORG

Blackline ORG
the entire month end DATE
SAP ORG
CRM PRODUCT
Conga Sign PERSON
days DATE
minutes TIME
Conga Grid PERSON
Salesforce GPE
A Learning Analytics Platform WORK_OF_ART
Consumer & Connected Devices Market Research and Analysis Understand ORG
the Bill of Material LAW
IHSMarkit ORG
US GPE
Global ORG
Software ORG
daily DATE
monthly DATE
over 90% PERCENT
daily DATE
monthly DATE
Unclaimed Property Compliance System ORG
the days DATE
UPCS ORG
CLM ORG
Apttus Intelligent Workflow Approvals ORG
a Conga Company ORG
MindTouch FAC
Business Process Management ORG
BPM ORG
Broadleaf GPE
Broadleaf GPE
Digital ORG
Investigations PERSON
OFCCP (Office of Federal Contract Compliance Programs ORG
Affirmative Action Plans ORG
The Office of Federal Contract Compliance Programs ORG
the U.S. Department of Labor ORG
Skilljar GPE
Quizzing PERSON
Learning Library PERSON
Expert PRODUCT
User Management ORG
Custom Branding PERSON
Seismic Magnolia CMS ORG
Java PERSON
JCR ORG
Magnolia GPE

Hippo CMS PERSON
Jahia GPE
JCR ORG
Capture ORG
Lucidworks Fusion ORG
ML ORG
TensorFlow ORG
MCI Telecommunications ORG
Telecom USA ORG
rTS (Traceability System ORG
Strivr GPE
ABC ORG
agile data ORG
SAP ORG
Company NORP
eSignature ORG
PDF ORG
Adobe Sign PRODUCT
the Adobe Document Cloud LAW
Adobe PERSON
AEM ORG
ActiveBatch ORG
Adobe Target PERSON
Anaplan PERSON
Anaplan ORG
CPQ ORG
Contract Management ORG
E-Commerce & Revenue Management ORG
a Conga Company ORG
Biscom ORG
FAXCOM Suite PERSON
Bonita PERSON
Bonita Community ORG
The Bonita Enterprise WORK_OF_ART
Dev PERSON
CA Automic Workload Automation WORK_OF_ART
ERP ORG
CA Productivity Accelerator ORG
Lease and Contract Management Software Costpoint ORG
ERP ORG
$1.5 trillion MONEY
GovWin IQ ORG
GovWin IQ ORG
DesignPro ORG
Elixir Suites PRODUCT
Windows NORP
DesignPro Tools Plus ORG
AFP ORG

Xerox ORG
Concurrent NORP
Instant Access to Market Trends ORG
Company & Industry Intelligence ORG
GXS ORG
CCM ORG
CCM ORG
the B2- SWM Renewal - Proforma - Output Sorting LAW
Bundling GPE
Node Locked ORG
PDF ORG
RightFax ORG
SAP GPE
Vendor Invoice Management ORG
Vendor Invoice Management Solutions ORG
OpenText ORG
ECM Platform PERSON
SAP ORG
SAP SuccessFactors, Salesforce ORG
Microsoft Office ORG
ECM ORG
IBM Business Monitor ORG
IBM ORG
XML ORG
ECM ORG
IBM ORG
ECM ORG
IBM ORG
Business Rule Management System ORG
BRMS ORG
IBM ORG
IBM ORG
Infor CloudSuite Workforce Management ORG
Infor Workforce Management ORG
JDA Software ORG
Blue Yonder LOC
Kronos Workforce Central ORG
The Wireless Retail Stores ORG
OnBase ORG
Hylands ORG
one CARDINAL
AP Transaction ORG
OnBase ORG
3rd ORDINAL
AnyDoc ORG
ITSM ORG
Microsoft Dynamics ORG
ERP ORG

Microsoft ORG
SQL Server PERSON
the Microsoft Dynamics ORG
MetaSolv Solution PRODUCT
MSS ORG
MSS ORG
IP ORG
PeopleSoft ORG
ERP ORG
HCM ORG
daily DATE
Designer ORG
Generate PERSON
Poppulo Mobile ORG
Poppulo ORG
nearly 20 years DATE
ReflectView ORG
America GPE
more than 400,000 CARDINAL
daily DATE
DocuWare ORG
AutoStore ORG
Ricoh PERSON
FTP ORG
Advanced Function Presentation ORG
AFP ORG
PDF ORG
SAP ORG
SAP ORG
ERP ORG
Systems Applications and Products in Data Processing WORK_OF_ART
ERP ORG
Hana Enterprise Cloud ORG
Seal ORG
SharePoint PRODUCT
Desktop ORG
SharePoint ORG
Google Drive FAC
SharePoint ORG
ROC GPE
Revenue Optimization Center ORG
Subex PERSON
two CARDINAL
RevenuePad ORG
MFT ORG
Verint Enterprise Workforce Management ORG
Nexidia GPE
Nice GPE

Clarabridge GPE
SEC ORG
EPM ORG
Oracle Hyperion Financial Management ORG
HFM ORG
AppExchange ORG
Coursera PERSON
BPM ORG
iGrafx NORP
iGrafx ORG
SinglePoint ORG
FIS PleaseReview ORG
PleaseReview ORG
up to a week DATE
minutes TIME
New Company ORG
Blackboard PERSON
RFP Team ORG
HCM ORG
ERP ORG
Cloud PERSON
16,000 CARDINAL
Workforce ORG
Thinkmart Automation Platform PERSON
TCO ORG
Value ORG
Loopio PERSON
Loopio s RFP PERSON
Security Questionnaire PERSON
1,000+ Integrations MONEY
Shibumi PERSON
Oracle Fusion Cloud Enterprise Performance Management ORG
EPM ORG
Oracle Enterprise Data Management Cloud ORG
EDM ORG
Cloud Apps PERSON
NetSuite Progress ORG
Managed File Transfer PERSON
MFT ORG
Moody's Analytics ABS Suite ORG
ECM ORG
SAP National Security Service Inc ORG
Certification Hub FAC
6 CARDINAL
12-month DATE
SAP Cloud Application Services ORG
SAP Cloud for Service ORG
an additional $154,125 MONEY

SAP Enable Now ORG
ERP ORG
FLA ORG
SAP Learning Hub WORK_OF_ART
SAP ORG
SAP ORG
Bank Identification Number ORG
AI ORG
EA ORG
metadata PERSON
EA ORG
EA ORG
metadata PERSON
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metadata PERSON
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EA ORG
metadata PERSON
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metadata PERSON
EA ORG
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metadata PERSON
EA ORG
EA ORG
metadata PERSON
EA ORG
EA ORG
metadata PERSON
EA ORG
Capsifi GPE
Jalapeno PERSON
metadata PERSON
EA ORG
Field Service ORG
Oracle Advanced Scheduler ORG
Oracle Spares Management ORG
1 year DATE
17.35 CARDINAL
2020 DATE
MA PERSON
00565-2017 DATE
RTLS ORG
Satellite ORG
ServiceNow ORG
BMC Helix ORG

Change management(Some PERSON
BMC Helix Custom Applications ORG
Prem - Concurrent User ORG
Remedy Custom Applications - Concurrent User License - ESO PERSON
Micro Focus Operations Orchestration ORG
Automatically ORG
Conga Composer PERSON
Appextremes ORG
ASC ORG
ASC ORG
CPQ ORG
Clients Iron Mountain ORG
Suplari NORP
Excel PRODUCT
Tableau GPE
Alfabet GPE
AI ORG
SPM ORG
SPM ORG
EA ORG
Alfabet GPE
Alfabet GPE
Calendly ORG
Calendly FAC
Calendly ORG
document & email management systems ORG
The Vertex Indirect Tax Accelerator ORG
SAP ORG
SAP ORG
Vertex GPE
RelativityOne ORG
AI ORG
RelativityOne ORG
RelativityOne ORG
millions CARDINAL
one CARDINAL
Apache Pulsar ORG
Apache BookKeeper ORG
StreamNative ORG
StreamNative Platform ORG
Apache Pulsar PERSON
StreamNative Platform ORG
Informatica Data Archive ORG
Archive Standard Edition Multi-core PRODUCT
Multi-OS Production Enterprise
 ORG
Informatica Data Archive Secure Edition Multi ORG
Multi-OS Production License

Informatica Data Archive Validation Bundle Multi ORG
Multi-OS Production License A ORG
BPM ORG
The ZIP Code Population Weighted Centroids LAW
USPS ORG
The Fusion Framework System ORG
daily DATE
4 CARDINAL
ServiceNow ORG
One CARDINAL
1 CARDINAL
4 CARDINAL
1 CARDINAL
4 CARDINAL
ServiceNow ORG
Customer Success - 1 Day PERSON
two CARDINAL
2 CARDINAL
ServiceNow ORG
two CARDINAL
2 CARDINAL
Business Management ORG
Agile Development ORG
Scaled Agile Framework PERSON
Test Management ORG
Release Management ORG
Resource Management ORG
Financial Planning ORG
Investment Funding; Innovation Management ORG
Alignment Planner Workspace PERSON
Predictive Intelligence ORG
Virtual ORG
Performance Analytics ORG
IT Business Management Professional ORG
IT Service Management ORG
ITSM ORG
US GPE
Citizen / US Soil Customer Support ORG
US GPE
US GPE
US GPE
non-US GPE
US GPE
non-US ORG
SME ORG
non-US NORP
SME ORG
US Support ORG

US GPE
Citizen / US Soil Customer Support ORG
ServiceNow ORG
US GPE
the Enterprise Support Account Management Package Vertex Sales Tax Rate Locator ORG
U.S. GPE
Canadian NORP
Retail Lite PERSON
Tax Module PERSON
General sales & ORG
BMC Compuware ORG
ThruPut ORG
BMC Compuware ThruPut ORG
monthly DATE
MLC ORG
one CARDINAL
SAP ORG
monthly DATE
Cloud Credit ORG
SAP Custom Development ORG
SAP Innovative Business Solutions ORG
more than 2,000 CARDINAL
38,000 CARDINAL
more than 4,000 CARDINAL
over 1,500 CARDINAL
ECM ORG
SAP ORG
SAP ORG
SAP Digital Boardroom ORG
Analytics Cloud VisualCron PERSON
Triggers PRODUCT
Job LOC
InsightSoftware ORG
Noetix PRODUCT
Oracle ORG
CMS ORG
Workato Workspace PERSON
Annually DATE
Workato GPE
REST ORG
• Unlimited ORG
Admin ORG
Analyst GPE
• Workbot PERSON
• Includes ORG
SSO ORG
• Encryption ORG

• SOC 2 Type 2 PRODUCT
GDPR ORG
Zenarate PERSON
PDF Library ORG
PDF ORG
PDF ORG
PDF ORG
PDF ORG
PDF ORG
AI ORG
IBM ORG
IBM ORG
API ORG
SOA ORG
Manta Data ORG
IBM ORG
IBM ORG
Business Rule Management System ORG
IBM ORG
IBM ORG
IBM ORG
WebSphere Application Server ORG
IBM ORG
IBM ORG
Business Automation ORG
Pega Cloud PERSON
Pega Infinity PERSON
Pega Strategic Business Applications PERSON
Pega PERSON
Pega Cloud PERSON
24x7 CARDINAL
Pega PERSON
years DATE
Pega PERSON
Fault ORG
Host-Based FW & IDS
Anti-Virus & Anti-Malware
File Integrity Monitoring
Data Management Services
Resiliency & Backup ORG
Management of Operating System ORG
Firewall PERSON
Encryption of Data-At-Rest ORG
Pega Cloud PERSON
Pega Cloud PERSON
the Pega Trust Center ORG
IBM ORG
CPQ Salesforce ORG

Configure, Price ORG
Quote Software ORG
U.S. GPE
Fed ORG
IRS ORG
1075 DATE
5 DATE
AWS GovCloud ORG
App Cloud PERSON
apps ORG
Slack PERSON
RSMF NORP
EML ORG
HTML ORG
Relativity ORG
Micro Focus Enterprise Server ORG
OpenText ORG
IBM ORG
Cloud PERSON
Learning Management System LMS ORG
the ART Developer Kit ORG
Learning Management System ORG
LMS ORG
Webserver ORG
UiPath Process Mining PERSON
UiPath Process Mining ORG
Process Mining ORG
• Data ORG
Visualize ORG
IBM ORG
IBM ORG
Adobe Primetime PERSON
Primetime ORG
Linear ORG
VOD PERSON
TVSDK ORG
QoS PERSON

Category: Telecom Network Management
Named Entities:
four modules QUANTITY
CRM PRODUCT
Relationship Management, Sales Automation, Marketing Automation iBwave Design ORG
Diamond IP Sapphire ORG
BT ORG
DHCP/DNS/IPAM ( ORG

Sapphire GPE
BT IPControl ORG
DNS ORG
AWS ORG
IPControl ORG
IP ORG
IPAM ORG
IPv4 CARDINAL
DNS ORG
DHCP ORG
TheCisco ONS 15454 Tunable Dispersion Compensation ORG
100/50 GHz PERCENT
Third-Party ORG
Cisco GPE
NOS ORG
Micro Focus' Network Automation ORG
NA ORG
2000 CARDINAL
NA ORG
Micro Focus Network Automation ORG
Micro Focus' Network Automation ORG
NA ORG
2000 CARDINAL
NA ORG
NetExpert ORG
BIG-IP Local Traffic ORG
LTM ORG
F5 CARDINAL
F5 CARDINAL
LTE PERSON
5 CARDINAL
Telarix GPE
Telarix GPE
FMS ORG
today DATE
VoIP LOC
SecureMedia DRM Network Related ORG
Server SW ORG
VMS ORG
DVR ORG
VOD ORG
VOD ORG
Ericsson Network PERSON
Hosted Ericsson ENM ORG
Ericsson PERSON
5 CARDINAL
4 CARDINAL
Innovation Center ORG

Alley ORG
Ericsson Network PERSON
Core ORG
Ribbon PERSON
the Virtual Network Function ORG
VNFM ORG
VNF Lifecycle Management ORG
Ribbon PERSON
VNFM ORG
ETSI NFV ORG
NFV Orchestrators ORG
Virtual Infrastructure Managers ORG
OpenStack ORG
LTE ORG
IoT ORG
5 CARDINAL
NetFlow Traffic Analyzer ORG
NTA ORG
SD-WAN ORG
WAN ORG
WAN ORG
Cisco Meraki PERSON
WiFi ORG
NetSense ORG
ASSIA ORG
DSL Expresse ORG
DSL ORG
DSL Expresse ORG
XML ORG
SOAP ORG
Operations Support System ORG
NAPI ORG
DSL Expresse ORG
OSS ORG
NAPI ORG
Expresse FAC
SNMP ORG
Java PERSON
JMX ORG
ASSIA ORG
CA Performance Management ORG
CA Performance Management ORG
SDN ORG
MSC ORG
EXFO ORG
ToolBox X. ORG
EXFO ToolBox Office ORG
7 CARDINAL

EXFOWorx ORG
Frame Loss ORG
Frame Delay PERSON
Frame Delay Variation ORG
Atoll ORG
third ORDINAL
Forsk SAS PERSON
RF ORG
5 CARDINAL
EGW ORG
E9-1-1 PRODUCT
9-1-1 DATE
Previously West Safety Services ORG
The Cisco Crosswork Infrastructure ORG
Cisco Crosswork Change Automation and Health Insights ORG
Cisco Crosswork Change Automation ORG
Automate GPE
IrisView ORG
ISA ORG
Iris Session Analyzer WORK_OF_ART
ISA ORG
healthcare ORG
VPN ORG
VDI ORG
UC GPE
Trusted Call Solutions ORG
first ORDINAL
LTE ORG
24x7x365 CARDINAL
TrueCall ORG
RAN ORG
one CARDINAL
Speedtest.net ORG
Speedtest ORG
Speedtest Software Application ORG
TCP/IP ORG
Test ORG
Test Results PERSON
Test ORG
QTI ORG
Virtual Front Office ORG
VFO ORG
Network Performance Monitor ORG
monitoring'software ORG
TestCenter ORG
Virtualization, Cloud Computing ORG
Mobile Backhaul PERSON
The DAX InTouch (Now ORG

Xcipio ORG
VoIP ORG
WiFi PERSON
Wi-Max PERSON
IMS ORG
5 CARDINAL
Tellabs NORP
Panorama PON PERSON
20 CARDINAL
QTY 4 Radisys Management System ORG
Delivery Module PERSON
Vantio NXR(TM) ORG
Delivery Module PERSON
SureSurf CARDINAL
Neustar UltraDNS ORG
DNS ORG
Java PERSON
https PERSON
Oracle 10 ORG
IBM ORG
2015 DATE
Local Circuit Provisioning ORG
Network Inventory Management ORG
Network Engineering Capabilities ORG
Product Lines: Converged Packet Access ORG
US Private Line ORG
Metro Private Line ORG
MPL ORG
Frame/PiP ORG
IDA/IDE ORG
Metro Switched Voice ORG
Connectbase ORG
The Connected World ORG
4tel CARDINAL
Neustar Service Order Administration ORG
SOA ORG
the Number Portability Administration Center LAW
NPAC ORG
Neustar ORG
NPAC ORG
NPAC ORG
IP ORG
TDM ORG
up to 10,000 CARDINAL
Ekahau Pro PERSON
Windows GPE
thousands CARDINAL
PWS ORG

NMA ORG
Telcordia ORG
Transport Element Management System ORG
Central Office ORG
SWITCH ORG
Facilities Administration Control System ORG
FACS ORG
FACS ORG
3 CARDINAL
SOACS ORG
first ORDINAL
FACS ORG
Order Administration ORG
Control Network ORG
NSDB ORG
NSDB ORG
Special Services ORG
NSDB ORG
NSDB ORG
WFA/C NMA/ ORG
F Delphi SOAC PERSON
NAMS ORG
Workforce Administration Control ORG
Work Force Administration / Control ORG
Special Services ORG
WFA/C ORG
Work Force Administration / Dispatch ORG
two CARDINAL
1 CARDINAL
2) Service MONEY
Work Force Administration / Dispatch ORG
the Central Offices ORG
Telcordia Element Communicator ORG
Link Management ORG
Network Elements & Element Management Systems ORG
SNAM ORG
STP ORG
STP ORG
BCR ORG
Customer Services ORG
LEIS PERSON
FACS ORG
March DATE
March DATE
MARCH DATE
5 CARDINAL
ITU ORG
3GPP PRODUCT

NetScout ORG
NETSCOUT ORG
NETSCOUT ORG
MasterCare ORG
24x7 CARDINAL
MasterCare ORG
5 CARDINAL
RAN ORG
5 CARDINAL
BERT ORG
TLS ORG
Speedtest ORG
ExtremeCloud IQ ORG
Hamilton PERSON
Tenacity ORG
Cisco GPE
Cisco GPE
Cisco GPE
Cisco UCS Fabric Interconnects ORG
Unified Fabric GPE
An Amdoc Company ORG
ATT ORG
Tracfone ORG
1 CARDINAL
2 CARDINAL
3 CARDINAL
4 CARDINAL
5 CARDINAL
Generates Event Detail Records ORG
6 CARDINAL
7 CARDINAL
Mobileum ORG
WEDO ORG
RAID ORG
Usage Control ORG
Business Assurance ORG
Network Node PERSON
Smart Plug-ins PERSON
Network Operations Management ORG

Category: Emerging Technologies
Named Entities:
Mobilogix ORG
Telit Acquires Mobilogix PERSON
Provide Custom IoT Project ORG
UiPath ORG
IoT ORG

Global Data Network ORG
Edge Computing Service ORG
70% PERCENT
Pub/Sub, Event Processing ORG
Serverless Platform PRODUCT
Guardian S ORG

Category: Design, Development & Delivery
Named Entities:
Global Data Network ORG
Edge Computing Service ORG
70% PERCENT
Pub/Sub, Event Processing ORG
Design Studio PERSON
Operational Support Systems ORG
Oracle Communications OSS ORG
Microsoft Visual Studio ORG
Microsoft ORG
Adobe Creative Cloud PERSON
Adobe Inc. ORG
Creative Cloud PERSON
20+ desktop MONEY
UX PERSON
SonarQube ORG
SonarSource ORG
29 CARDINAL
Adobe Captivate PERSON
Adobe Captivate PERSON
Flash PERSON
Flash PERSON
Fisheye ORG
over 300,000 CARDINAL
AWS ORG
GCP ORG
SW GPE
Dev Ed PERSON
SonarCl SonarCloud Subscription ORG
SonarLint ORG
SonarSource ORG
2 CARDINAL
Jetbrains PERSON
Postman Pro ORG
Mac GPE
Windows GPE
Linux PERSON
Slots ORG
API ORG

Postman GPE
Dolby Vision PERSON
HDR ORG
4 CARDINAL
Dolby Vision Consumer Decoder - Source Device The Dolby HDR PERSON
Dolby Vision Source Devices ORG
Dolby Vision Source/Devices Sold ORG
that year DATE
ACP ORG
Approx GPE
50 CARDINAL
Monotype Imaging Holdings Inc. ORG
American NORP
The Red Carpet Subscription ORG
one CARDINAL
CodeBuild ORG
CodePipeline ORG
Test Android PERSON
AWS ORG
Restricted ORG
Sandbox GPE
2018 DATE
Resource Groups ORG
AWS Service Catalog ORG
metadata PERSON
AWS Service Catalog ORG
2019 DATE
PowerBuilder ORG
Windows NORP
Sybase ORG
SAP ORG
Win32 PERSON
SAP Aspose ORG
API ORG
Java PERSON
Android PERSON
SharePoint ORG
Reporting Services ORG
Smalltalk PERSON
GitLab ORG
DevOps ORG
Git GPE
wiki ORG
three CARDINAL
Ultimate ORG
GitLab Runner PERSON
GitLab ORG
GitLab CI ORG

HCL Digital Experience ORG
IBM WebSphere Application Server ORG
IBM ORG
Websphere Helm PERSON
Kubernetes ORG
Kubernetes ORG
Software Delivery Excellence PERSON
DevOps & ORG
Debug Tool PERSON
C++ GPE
PL/I programs ORG
IBM ORG
DevOps ORG
XL C ORG
IBM ORG
IBM ORG
IBM ORG
CPLEX Optimization Studio ORG
4GL GPE
Informix ORG
the mid-1980s DATE
IBM WebSphere Integration Developer ORG
Business Process Execution Language ORG
Red Hat ORG
OpenShift ORG
IBM ORG
IBM Cloud ORG
OpenShift ORG
IBM ORG
Rational  Application Developer for WebSphere  Software ORG
Eclipse PRODUCT
IBM ORG
TestManager ORG
TestManager ORG
TestManager ORG
Reactive Platform PERSON
Cloud Native PERSON
Microsoft Windows ORG
Jenkins PERSON
Java PERSON
Continuous Integration ORG
Jenkins PERSON
Fully ORG
DevOps ORG
DevOps ORG
Microsoft Visual Studio ORG
Microsoft ORG
Visual Studio Standard PERSON

Visual Studio PERSON
Visual Studio PERSON
MSDN NORP
Visual Studio PERSON
Standard PERSON
Pro NORP
NeoLoad ORG
Tricentis PRODUCT
NeoLoad ORG
2021 DATE
JavaScript ORG
JavaScript PRODUCT
OSS ORG
Perfecto PRODUCT
Macs ORG
Spring DATE
NET ORG
ExamDiff Pro PRODUCT
Microsoft Windows ORG
DevCraft ORG
JavaScript UI ORG
Kendo UI ORG
Kendo UI PERSON
HTML5 ORG
70+ UI PERCENT
Model-View-ViewModel ORG
Implementer PERSON
the IBM iSeries ORG
SAPIEN ORG
DevOps Suite PRODUCT
SAPIEN Technologies ORG
PrimalScript ORG
PowerShell Studio ORG
VersionRecall PRODUCT
PowerShell HelpWriter ORG
WMI Explorer ORG
PowerShell ModuleManager ORG
SDK ORG
Ext JS PERSON
JavaScript PRODUCT
Ajax ORG
DHTML ORG
DOM ORG
Tricentis Tosca PERSON
Automated Continuous Testing PERSON
API ORG
JRebel PERSON
JVM PERSON

Java PERSON
JRebel PERSON
Ubiquiti UniFi AP Pivotal'tools ORG
Oracle ORG
Micro Focus COBOL ORG
PeopleSoft ORG
Visual GPE
last year DATE
Oracle ORG
the Server Express ORG
Net Express ORG
December DATE
2020 DATE
Qlik PERSON
Tricentis PERSON
Agile ORG
Atlassian Bamboo PERSON
CI ORG
Git GPE
Template for React Applications Single ORG
Native Android PERSON
IOS Development Platform Application State Management Services / Microservices
Stylesheet ORG
Tempo PRODUCT
Vantage GPE
Tempo PRODUCT
Tempo PRODUCT
Lightspeed PERSON
Tempo PRODUCT
Tempo PRODUCT
Vantage ORG
BrowserStack PERSON
Screenshots ORG
Unlimited Screenshots ORG
API ORG
Unlimited Automate Desktop ORG
Unlimited Automate Mobile ORG
SSO Integrations, Access Control ORG
Usage Analytics ORG
IP ORG
60 CARDINAL
App Automate PERSON
Android ORG
Access PRODUCT
Unlimited Appium ORG
Users/40 PRODUCT
the Particular Service Platform

NServiceBus ORG
Messaging & ORG
ServiceInsight PERSON
ServicePulse PRODUCT
The Losant Enterprise IoT Platform ORG
millions CARDINAL
CAT ORG
CAT ORG
DevOps ORG
Android ORG
Windows Phone PERSON
Blackberry Provides ORG
HPC ORG
The Akana Enterprise API Platform ORG
API ORG
IM Creator ORG
HTML5 PERSON
WYSIWYG ORG
CA Service Virtualization ORG
LISA ORG
CloudFrame ORG
Java  Workbench PERSON
Compuware ORG
The Compuware Workbench ORG
their day DATE
Workbench GPE
Compuware ORG
Test Data Optimization ORG
Strobe GPE
monthly DATE
MLC ORG
Test Data Optimization ORG
Xpediter EP - XPEDITER PERSON
IBM ORG
TSO ORG
IMS ORG
IBM ORG
TSO ORG
IMS ORG
Dev Ops Development PERSON
GitHub Enterprise Server ORG
GitHub.com ORG
SQL ORG
IDE ORG
Developer Extension ORG
SQL PERSON
Micro Focus' Agile Manager ORG
LoadRunner ORG

Micro Focus ORG
LoadRunner ORG
thousands CARDINAL
QuickTest Professional ORG
SourcePro ORG
SourcePro ORG
Pendo ORG
Vantage Array PERSON
Transcode Multiscreen PERSON
Vantage Analysis ORG
Vantage Transcode IPTV VOD ORG
Captioning Products ORG
Quick Base PERSON
Quickbase PERSON
LaunchDarkly PERSON
Helix Core ORG
IP ORG
one CARDINAL
Helix NORP
apps ORG
Apache JMeter PRODUCT
the Apache Software Foundation ORG
Oracle Database ORG
Oracle Database ORG
Real Application Testings Database Replay ORG
Micro Focus Service Virtualization ORG
Moon PERSON
Selenium, Cypress ORG
Puppeteer PERSON
Kubernetes ORG
Moon PERSON
Kubernetes ORG
SW Configuration ORG
Jenkins Platform - Enterprise Edition - Set PERSON
100 CARDINAL
Jenkins Platform PERSON
monthly DATE
Jenkins PERSON
Jenkins Platform PERSON
Jenkins PERSON
AccuRev ORG
SCM ORG
IBM ORG
Rational  Synergy ORG
SCM ORG
Linux Foundation ORG
AppOps Release PRODUCT
CPQ ORG

Subscription Billing ORG
B2B Commerce and Field Service Lightning ORG
InVision ORG
one CARDINAL
Microsoft Developer Network ORG
Microsoft ORG
API ORG
Visual Studio Subscriptions Acquia Cloud Site Factory ORG
VISP ORG
Run and Optimize Sites ORG
Drools ORG
EVE - ORG
The Emulated Virtual Environment For Network ORG
DevOps Professionals ORG
today DATE
EVE-NG PRO ORG
first ORDINAL
EVE-NG PRO ORG
EPI-USE Labs  Data Sync ORG
DSM ORG
AI ORG
Illuminated Cloud PERSON
JetBrains ORG
IDEA ORG
Illuminated Cloud PERSON
Java PERSON
UI ORG
Akka PERSON
Accelerate ORG
Matilda ORG
DevOps ORG
CI ORG
DevOps ORG
CI ORG
MotioCI ORG
Cognos PRODUCT
Value Stream Management ORG
Planview ORG
2022 DATE
App Engine PERSON
AG Grid ORG
Multicloud NAC PERSON
zero CARDINAL
Premium Success for Subscription ORG
Professional Services - Fixed Fee Consulting SeaLights Test Impact Analytics ORG
Dev & QA ORG
Intro.js ORG
JavaScript ORG

first ORDINAL
the SAP Change Impact Analysis ORG
Tricentis PERSON
AI ORG
SAP Fiori ORG
ABAP language PRODUCT
Design NORP
GCF ORG
Dekra CATM1 PERSON
ACP ORG
ACP ORG
BYOD ORG
3GPP R17 ORG
Adobe ColdFusion ORG
The Twilio Programmable Voice API ORG
Interactive Voice Response ORG
IVR ORG
Anaconda GPE
Windows GPE
macOS PERSON
Modeling Labs PERSON
Cisco Modeling Labs ORG
Modeling Labs PERSON
minutes TIME
Copado PERSON
DevOps ORG
DevExtreme ORG
50+ UI PERCENT
Knockout PERSON
MVC ORG
thousands CARDINAL
Canva PERSON
GitHub Copilot ORG
dozens CARDINAL
GitHub Copilot ORG
GitHub Copilot ORG
GitHub Copilot for Business ORG
360 CARDINAL
Articulate 360 Teams ORG
Storyline 360 ORG
Storyline GPE
Rise 360 DATE
iText 5 Enterprise Subscription CORE ORG
java) Version ORG
5.0 CARDINAL
PDF ORG
Java PERSON
PDF ORG

the iText 7 Suite ORG
PDF SDK ORG
MUI X ORG
React UI ORG
Material UI ORG
MUI X ORG
MIT ORG
Pro NORP
MUI X ORG
Flyway NORP
Cognos Framework GPE
Motio PI Professional ORG
Cognos PRODUCT
Cognos PRODUCT
Framework Models PERSON
Cognos PRODUCT
Cognos NORP
IBM ORG
Red Hat Process Automation ORG
IBM ORG
Optimization Studio PERSON
ILOG S.A. ORG
IBM ORG
January, 2009 DATE
IBM ORG
dozens CARDINAL
AI ORG
Codeium FAC
Android ORG
ASN ORG
1 CARDINAL
IDL ORG
Salesforce.com ORG
Develop ORG
Windows NORP
UNIX ORG
Linux PERSON
OpenText  Net Express ORG
Server Express ORG
VisiBroker ORG
VisiBroker ORG
VisiBroker Development Server ORG
Vericheck PERSON
VisiBroker Development Server ORG
vRepair ORG
VisiBroker Development Server ORG
Test/Dev ORG
Vericheck PERSON

```
VisiBroker Development Server ORG
Test/Dev ORG
vRepair ORG
VisiBroker Development Server License ORG
Vericheck PERSON
VisiBroker Development Server License for vRepair COBOL Server ORG
Focus Server Express ORG
UNIX ORG
Linux PERSON
Server Express ORG
Java, Web Services ORG
XML ORG
CICS ORG
JCL ORG
IBM ORG
Silk Performer PERSON
Silk Performer PERSON
SSIS ORG
PowerPack PRODUCT
70 CARDINAL
SSIS ORG
Microsoft SQL Server Integration Services ORG
SSIS ORG
PowerPack PRODUCT
REST API Services ORG
Azure Cloud PERSON
Amazon AWS Cloud ORG
JSON PERSON
XML ORG
CSV ORG
Excel PRODUCT
Google API ORG
AdWords ORG
Twitter PERSON
Zendesk PERSON
eBay ORG
```

BI & Data Analytics: Entities like Informatica, MicroStrategy, Amazon Kinesis, Apache Hadoop, and IBM dominate, showing the prevalence of key BI tools and platforms.

Performance, Monitoring & Logging: Key entities include Grafana, Datadog, SolarWinds, and Dynatrace, reflecting tools used for monitoring and performance management.

AI & ML: Important entities like IBM, Amazon Comprehend, DataRobot, and Nuance show the focus on AI tools, machine learning platforms, and cloud-based AI services.

GIS (Geographic Information Systems): Entities like Google Maps, Esri, Pitney Bowes, and USPS highlight key players in mapping, location services, and geospatial analytics.

Management & Governance: Tools like Jira, Atlassian, and SAP indicate the prominence of project management and governance software.

Digital Workplace: Entities such as Slack, Microsoft Teams, Citrix, and Google Workspace dominate, pointing to collaboration and productivity tools.

IT Infrastructure Software Services: Key platforms like Microsoft, AWS, IBM, and Oracle show tools for IT infrastructure management.

Marketing Management: Entities like Salesforce, Adobe, Tealium, and Google Analytics dominate, highlighting platforms used in customer journey and marketing analytics.

Customer Operational Platforms: Tools like Salesforce, Oracle, and Verint are prevalent in managing customer service and operational workflows.

Telecom Network Management: Entities like Cisco, Ericsson, F5 Networks, and SDN dominate, emphasizing telecom network management platforms.

Emerging Technologies: Entities like UiPath, IoT, and Edge Computing highlight innovations in automation, IoT, and edge technologies.

What we can do with these data: 1. **Feature Engineering**: NER results can be used to create entity-based features, such as binary or frequency indicators for organizations, products, or technologies. These entities can be grouped into broader categories (e.g., cloud platforms, analytics tools) to generate more abstract features that enhance model input. LDA results, on the other hand, allow us to extract topic-based features, where each document is represented as a mixture of topics. These features can be used in classification models or for clustering similar products based on topic distributions. 2. We can also Group similar entities into broader categories (e.g., cloud platforms, analytics tools) and use these as features. This could help distinguish products by the technology stack they rely on.

2. **Model Building**: The extracted NER and LDA features can be integrated into various models, such as text classification, where they help categorize product descriptions into relevant categories like BI, AI, or Telecom. Additionally, these features are useful in recommendation systems, where they help identify and suggest similar products based on shared entities or topics. For clustering and segmentation, the combination of entities and topics can reveal hidden patterns in the data, improving the precision of product groupings.

3. **Improving Model Accuracy**: Incorporating NER and LDA features into the dataset can provide models with more context and improving their accuracy in classification, recommendation, or clustering tasks. The LDA topics also help reduce high-dimensional text data into fewer, interpretable components, making models more efficient.

[45]:
```
from nltk.tokenize import word_tokenize
import nltk

nltk.download('punkt')

# Tokenize the product descriptions for each category
merged_df['tokenized_description'] = merged_df['product_description'].
 ↪apply(lambda x: word_tokenize(str(x).lower()) if pd.notnull(x) else [])
```

```python
# Display the tokenized descriptions
print(merged_df[['taxonomy_category', 'product_description',␣
↪'tokenized_description']].head())
```

```
[nltk_data] Downloading package punkt to
[nltk_data]     C:\Users\nchen\AppData\Roaming\nltk_data…
[nltk_data]   Package punkt is already up-to-date!
```

```
     taxonomy_category                                product_description  \
0  BI & Data Analytics  The Informatica Cloud Secure Agent is a lightw…
1  BI & Data Analytics  The MicroStrategy platform supports interactiv…
2  BI & Data Analytics  The Signature Services is a package of key ser…
3  BI & Data Analytics  Vizlib is a fully supported third-party visual…
4  BI & Data Analytics  Informatica PowerCenter and PowerConnect Adapt…

                              tokenized_description
0  [the, informatica, cloud, secure, agent, is, a…
1  [the, microstrategy, platform, supports, inter…
2  [the, signature, services, is, a, package, of,…
3  [vizlib, is, a, fully, supported, third-party,…
4  [informatica, powercenter, and, powerconnect, …
```

[ ]:

```python

```