



PUBLIC SECTOR
SUMMIT ONLINE

Artificial intelligence and machine learning for a modern citizen service experience

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Amazon Web Services

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Solutions Architect
Amazon Web Services

The need for conversation AI/ML solutions

Public sector organizations are experiencing a high volume of requests for health, financial, educational, and municipal information

By modernizing citizen services, organizations can quickly answer questions and provide relevant information to its constituents



**American
Heart
Association®**



**SAINT LOUIS
UNIVERSITY™**
— EST. 1818 —



Jet Propulsion Laboratory
California Institute of Technology

Agenda

Challenges of a traditional QnA solution

Why is machine learning important for this solution

Key components of the ML-enabled QnA solution

Demonstration

How to get started

Question and answer service – traditional approach

Strategies

Call center



Traditional search



FAQs

How to pay my bill?

How to defer payment?

Challenges

Costly
capacity planning

Inaccurate results
Impersonal

Impersonal
Bad UI

Building a better conversation

Why is language hard?

Conversational

I would like to order flowers

What type of flowers would you like to order?

roses

What day do you want the roses to be picked up?

tomorrow

Pick up the roses at what time on 2018-08-24?

6pm

Okay, your roses will be ready for pickup by 18:00 on 2018-08-24. Does this sound okay?

Why is language hard?

Versatile

- I want flowers
- I'd like some roses
- Flowers please

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Why is language hard?

Ambiguous

- Tomorrow morning
- Afternoon of Aug 24
- 5:00 PM on August 24

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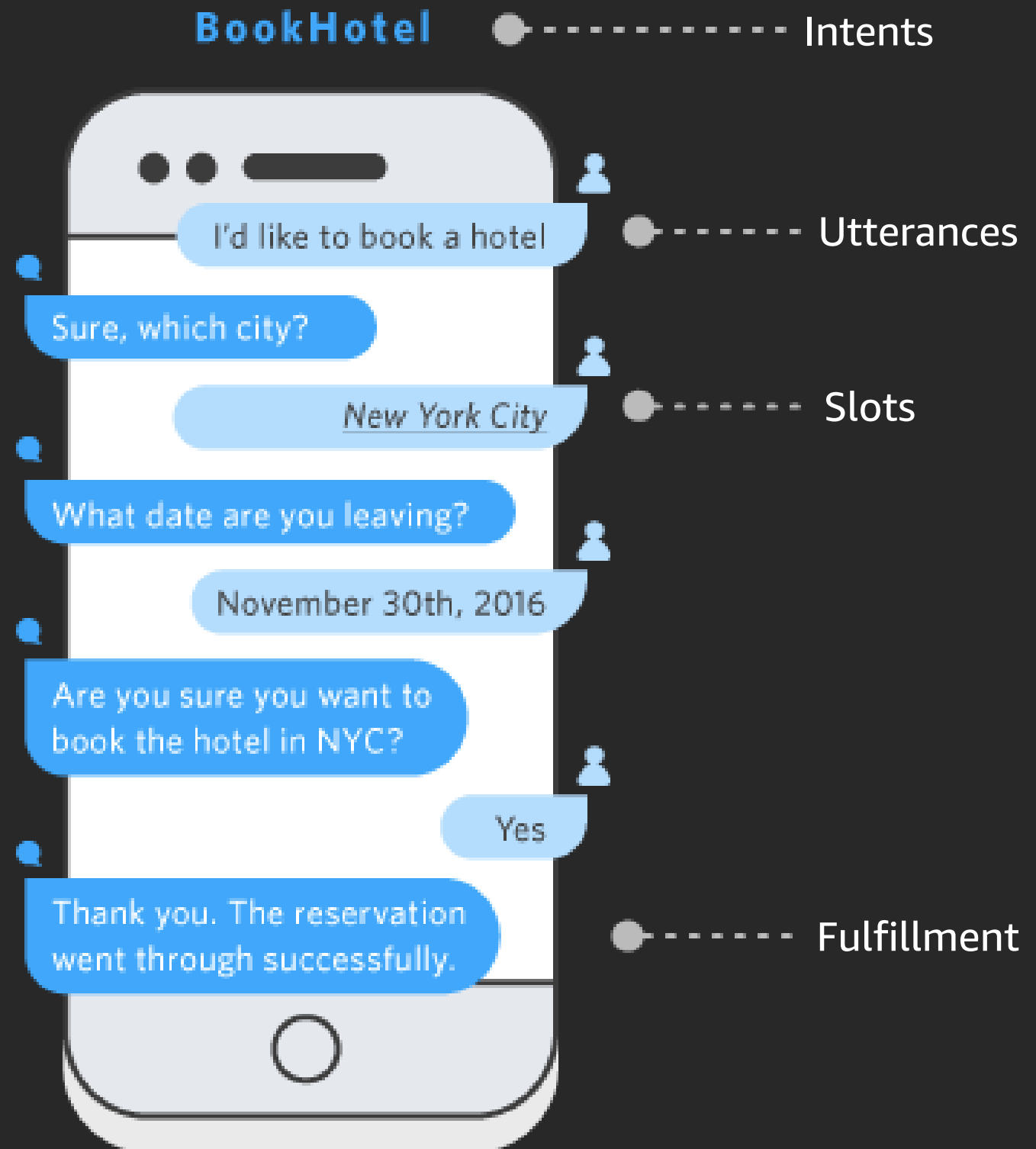
Actionable information

Simpler conversations

AWS solution



Amazon Lex



Amazon Lex – Reimagining the Conversational Interface



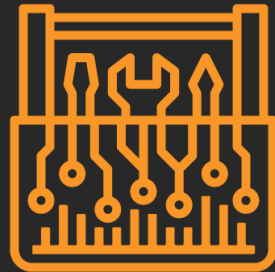
High quality ASR/NLU

The same speech recognition and language understanding tech that powers Alexa



Multi-Platform Deployment

One-click deployment across chat services, mobile clients, web apps and IoT devices



Designed for Builders

Efficient and intuitive tools to build AI-powered conversations; scales automatically



Enterprise Ready

Suite of in-built SaaS connectors to access enterprise systems and databases



Continuous Improvements

New features such as multi-turn conversation, prompts and intent chaining to increase customer intelligence

Providing answers to questions

Key challenges

Low accuracy

- 80% of data is unstructured
- Keyword engines

Complexity

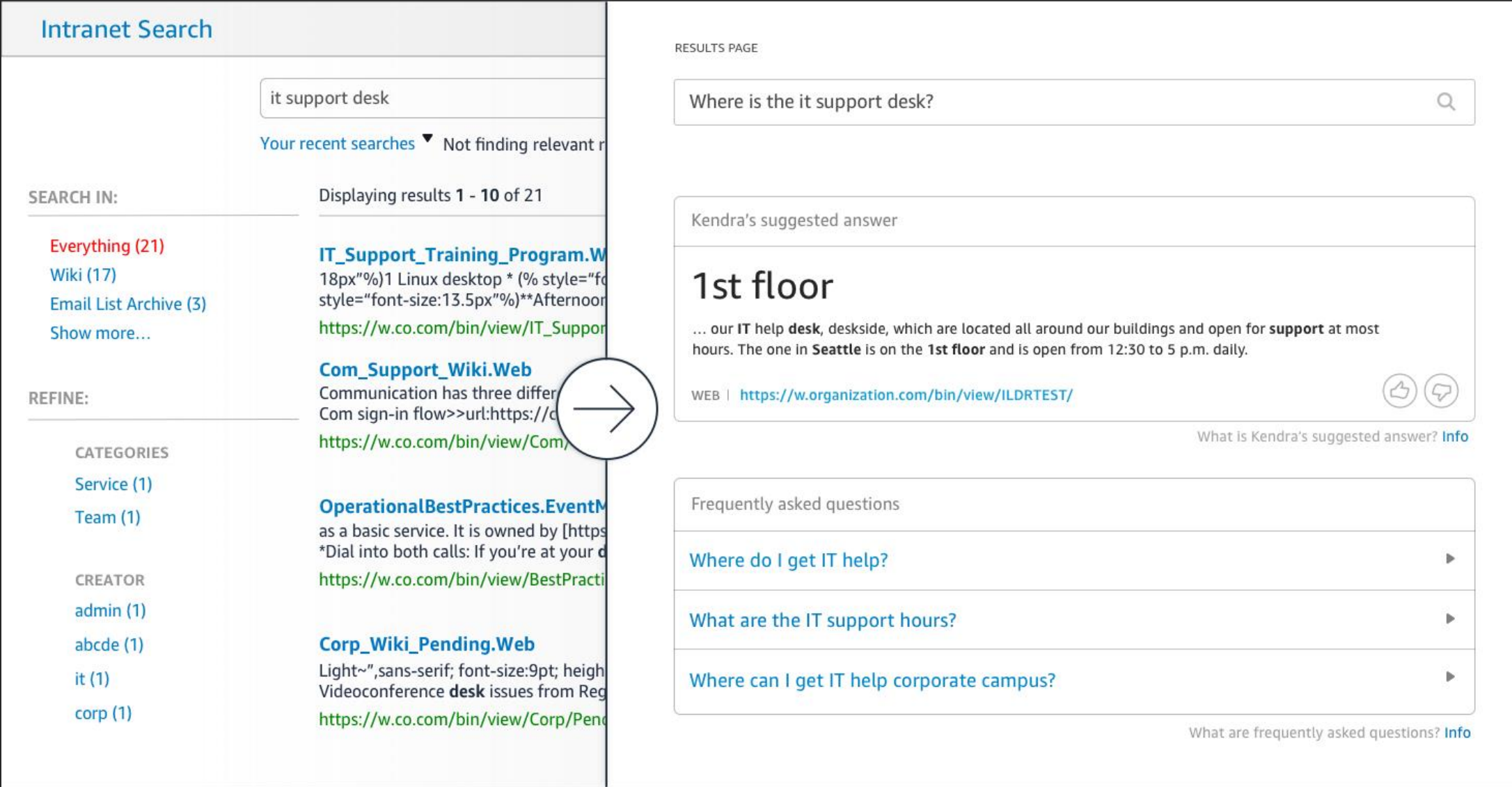
- Scattered data silos
- Stale search results
- Difficult to set up

Simpler answers

AWS solution



Amazon
Kendra



Intranet Search

it support desk

Your recent searches ▾ Not finding relevant r

SEARCH IN: Displaying results 1 - 10 of 21

- Everything (21)
- Wiki (17)
- Email List Archive (3)
- Show more...

REFINE:

CATEGORIES

- Service (1)
- Team (1)

CREATOR

- admin (1)
- abcde (1)
- it (1)
- corp (1)

IT_Support_Training_Program.W
18px"%)1 Linux desktop * (% style="fo
style="font-size:13.5px"%)**Afternoon
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Com_Support_Wiki.Web
Communication has three differ
Com sign-in flow>>url:https://d
<https://w.co.com/bin/view/Com>

OperationalBestPractices.EventM
as a basic service. It is owned by [https
*Dial into both calls: If you're at your d
<https://w.co.com/bin/view/BestPracti>

Corp_Wiki_Pending.Web
Light~",sans-serif; font-size:9pt; heigh
Videoconference desk issues from Reg
<https://w.co.com/bin/view/Corp/Pend>

RESULTS PAGE

Where is the it support desk?

Kendra's suggested answer

1st floor

... our IT help desk, deskside, which are located all around our buildings and open for support at most hours. The one in Seattle is on the 1st floor and is open from 12:30 to 5 p.m. daily.

WEB | <https://w.organization.com/bin/view/ILDRTEST/>

What is Kendra's suggested answer? Info

Frequently asked questions

- Where do I get IT help?
- What are the IT support hours?
- Where can I get IT help corporate campus?

What are frequently asked questions? Info

Amazon Kendra

Rethinking enterprise search for everyone



Natural Language Queries

Natural language queries

“Where is the IT support desk in Kumo?”
→ “First floor”

Keyword queries

“Health benefits” or
“parking allowance”

Amazon Kendra

Rethinking enterprise search for everyone



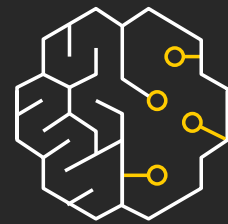
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NLU and ML core

Better answers

- Reading Comprehension
- FAQ matching
- Document ranking

Amazon Kendra

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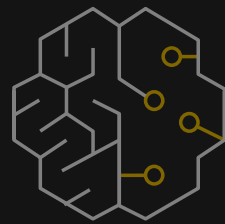
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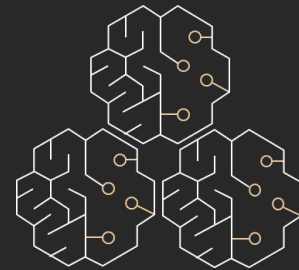
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Domain Expertise

Optimized for 14 major domains

IT, Financial Services, Insurance, Pharma, Industrial, Energy, Legal, Media and Entertainment, Travel and Hospitality, Health, HR, News, Telecommunications, and Automotive

Amazon Kendra

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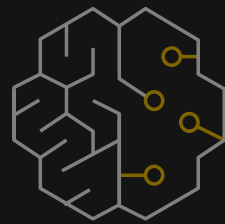
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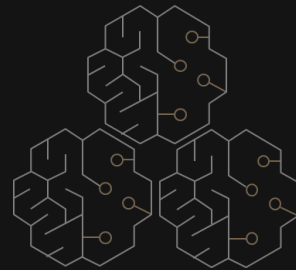
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Continuous Improvement *(Coming Soon)*

Kendra improves automatically over time

- Captures click-through and user feedback
- Retrains models periodically

Amazon Kendra

Rethinking enterprise search for everyone



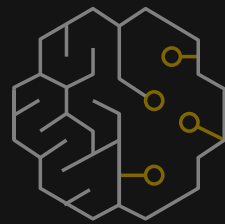
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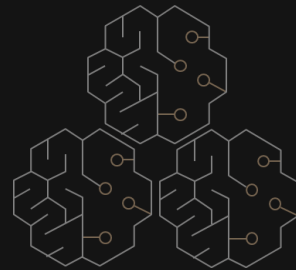
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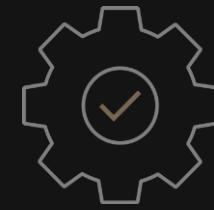
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Native connectors

6 of the most popular and counting

Amazon S3, SharePoint Online, Amazon RDS databases, Salesforce, ServiceNow, One Drive, etc.

Amazon Kendra

Rethinking enterprise search for everyone



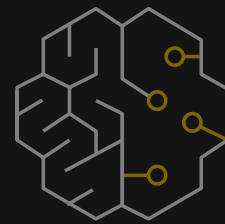
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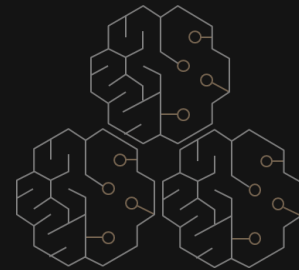
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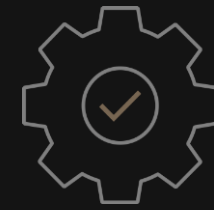
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Simple experiences and Code samples

In-console search

- Test your queries
- Tune your relevance

Code samples provided

→ Replicate Amazon Kendra search components in your application

Boosting results

Boost text, date and numeric field types on a 1-10 scale to increase their searchability.

Search fields for boosting

Text | Date | Numeric

- ▶ title Boost: 1
- ▶ author Boost: 1
- ▶ description Boost: 1
- ▶ category Boost: 1
- ▶ tags Boost: 1
- ▶ body_text Boost: 1
- ▶ data_source Multi: 5,1,1...

Data source boost
Boost relevance of individual data sources....

marketing-documentation
Source: sharepoint ID: 38937487343

wiki-hr

Data sources

Relevance tuning

Boost text, date and numeric field types on a 1-10 scale to increase their searchability.

Search fields for boosting

Text | Date | **Numeric**

- ▶ like_count Boost: 10

Numeric boost
Boost searchability based on ascending or descending order of numbers in this field.

Ascending
 Descending

View/like counts

Relevance tuning

Boost text, date and numeric field types on a 1-10 scale to increase their searchability.

Search fields for boosting

Text | **Date** | Numeric

- ▼ creation_date Boost: 5

Freshness boost
Boost freshness of creation_date field.

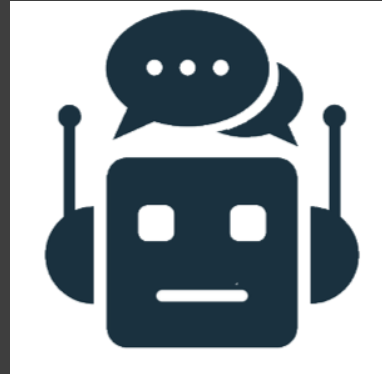
▼ **Additional boosting**
Fine tune time sensitivity

Sensitivity range
Adjust slider to capture range of sensitivity. Smaller the range, the more sensitive results are to daily changes.

Document freshness

Combining rich conversation with smart answers

Modernize your QnA solution



Chatbot Interface (Amazon Lex)

Automatically answer common questions without the assistance of a live agent

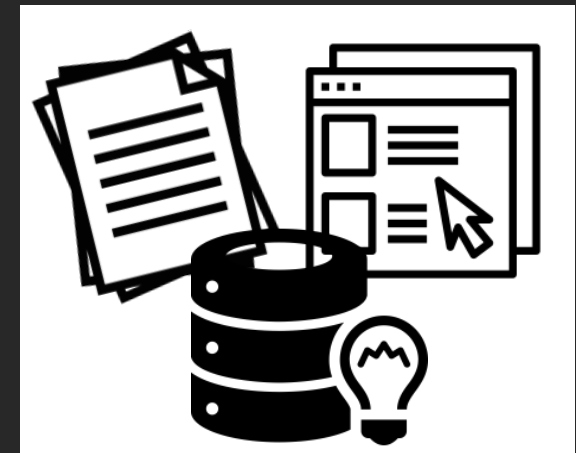
Available 24/7



Enterprise Search (Amazon Kendra)

Find highly accurate answers based on natural language search versus keywords

Continuously improving



FAQs, knowledge base, product manuals, websites

*Combine Amazon Lex's chat interface with Amazon Kendra's search engine and your knowledge base to create a QnA bot where users can just **ask their questions** and get **quick and relevant answers***

Smart answers and conversations

Where is the IT support desk?

37th floor; 2nd floor, room 221 (two rights after you get out of the elevators).

Can I come at noon?

Sure, what's the problem?

⋮



The Amazon Machine Learning (Amazon ML) Stack

Broadest and most complete set of machine learning capabilities

AI SERVICES

VISION Amazon Rekognition	SPEECH Amazon Polly	 Amazon Transcribe <i>+Medical</i> NEW	TEXT Amazon Comprehend <i>+Medical</i>	 Amazon Translate	 Amazon Textract	NEW! SEARCH Amazon Kendra	CHATBOTS Amazon Lex	PERSONALIZATION Amazon Personalize	FORECASTING Amazon Forecast	NEW! FRAUD Amazon Fraud Detector	NEW! DEVELOPMENT Amazon CodeGuru	NEW! CONTACT CENTERS Contact Lens <i>For Amazon Connect</i>
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ML SERVICES

 Amazon SageMaker	Ground Truth	Augmented AI	ML Marketplace	SageMaker Studio IDE NEW!						Neo		
				NEW! Built-in algorithms	NEW! Notebooks	NEW! Experiments	Model training and tuning	NEW! Debugger	NEW! Autopilot	Model hosting	NEW! Model monitor	

ML FRAMEWORKS AND INFRASTRUCTURE

NEW! TensorFlow	NEW! mxnet	GLUON	Keras	Deep Learning AMIs and Containers	GPUs and CPUs	Elastic Inference	Inferentia	FPGA
NEW! PYTORCH	HOROVOD							

Demo

Combining conversation and smart answers



Amazon Lex



Amazon Kendra

User 8:16 PM Question & Answer (Kendra)
Where's the IT Help Desk?

helpdeskbot APP 8:16 PM
2nd floor; room 221 (two rights after you get out of the elevator)

User 8:16 PM Make Appointment (Lex)
Can I come in at noon?

helpdeskbot APP 8:16 PM
Yes, what is the issue you are having?

User 8:17 PM
I have a cracked laptop screen

helpdeskbot APP 8:17 PM
For verification purposes, can I get the last four digits of your employee ID?

User 8:17 PM
1234

helpdeskbot APP 8:17 PM
Got it, we'll see you then to take a look at your laptop screen issue.

User 8:17 PM Question & Answer (Kendra)
How long does it take to fix a screen?

helpdeskbot APP 8:17 PM
Laptop screen repairs typically take 4 hours.

User 8:17 PM
What do I need to bring with me for a screen repair?

helpdeskbot APP 8:17 PM
For a laptop screen repair, please bring your employee badge, laptop, and VPN fob.

User 8:17 PM
How do I access my documents while my laptop is being repaired?

helpdeskbot APP 8:18 PM
You can use Amazon Workdocs to access your documents.

User 8:18 PM Answer (Kendra)
Can I access Amazon Workdocs from my tablet?

helpdeskbot APP 8:18 PM
I couldn't find a specific answer, but here's an excerpt from a document (Amazon WorkDocs - Mobile and web access) that might help:

Users can also access Amazon WorkDocs using the web browser on any mobile device.

Q: Will I have offline access to documents in Amazon WorkDocs on my mobile device?

Users can select which documents to make available for offline viewing using our free applications for iPad, Kindle Fire, and A...

User 8:18 PM Document link (Kendra)
How do I use workdocs again?

helpdeskbot APP 8:18 PM
Here are some documents you could review:

- [Amazon WorkDocs - Mobile and web access](#)
- [Amazon WorkDocs Drive](#)
- [Amazon WorkDocs - Sync](#)

Demo

COVID-19 use case

<https://cord19.aws>

How long does COVID-19 live on plastic?

Up to 72 hours according to the research performed by

Top suggested answer

How long does COVID-19 live on plastic surfaces?

up to 72 hours

...

[Radiation Therapy in King County, Washington During the COVID-19 Pandemic: Balancing Patient Care, Transmission Mitigation, and Resident Training](#)

Recent data suggest that COVID-19 remains viable on plastic surfaces for up to 72 hours. 7 Radiation treatment devices thus serve as a potential transmission nidus. To mitigate this risk, immobilization devices such as VakLok bags are individually disinfected and wrapped in a plastic bag that is sealed and changed after each daily use (Fig 2). Other hardware that comes into direct contact with patients, such as treatment tables and positioning aides, are extensively disinfected between uses. For respiratory motion management, we have developed a protocol for the use of the Active Breathing Controller (Elekta Inc), which is used at several centers.



Why ML powered search?

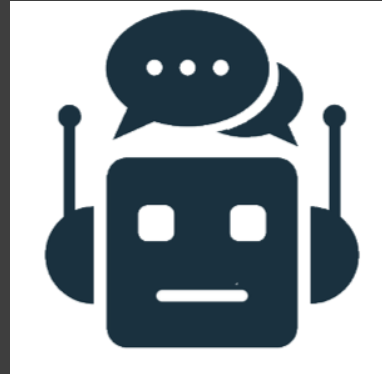
Amazon Kendra

- Fully managed **semantic** search service
 - ML-powered out of the box
 - **Native Connectors**, and other features
- Natural language queries
 - Factoid and FAQs - "Where is re:Invent?"
- For unstructured content (**context**)
 - "What is the best hotel in Chicago?"

Amazon ES

- Fully managed **keyword** search engine
 - For developing custom search applications or providing Kibana frontend
- Used mostly for keyword searches
 - Log analytics – search for 'Error-x'
- For structured content (**catalogue**)
 - 'Hotel,' 'Chicago'

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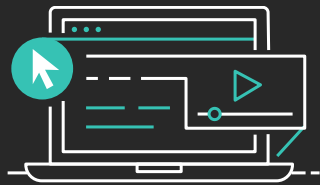
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Learn machine learning with AWS Training and Certification

Resources created by the experts at AWS to help you build and validate machine learning skills



Explore tailored ML learning paths for business decision maker, developer, data scientist, and data platform engineer roles



Learn at your convenience with 65+ no-cost digital courses or register for a live instructor-led training class featuring hands-on labs and opportunities for practical application



Take the **AWS Certified Machine Learning – Specialty** exam to validate expertise in building, training, tuning, and deploying ML models

Visit the ML learning paths at <https://aws.training/MachineLearning>

Thank you!

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