
From Answers to Actions

Dekang Lin
@naturali.io

Overview

- ◆ Google Question Answering
- ◆ Google Assistant and others
- ◆ naturali.io 小不点

Google Question Answering

- ◆ Answers from Knowledge Graph
 - Translate NL queries into Knowledge Graph retrieval queries
- ◆ Answers from the web
 - Extract answers from top web search results



Who was Tom Cruise's wife in 2007



All

News

Images

Videos

Shopping

More ▾

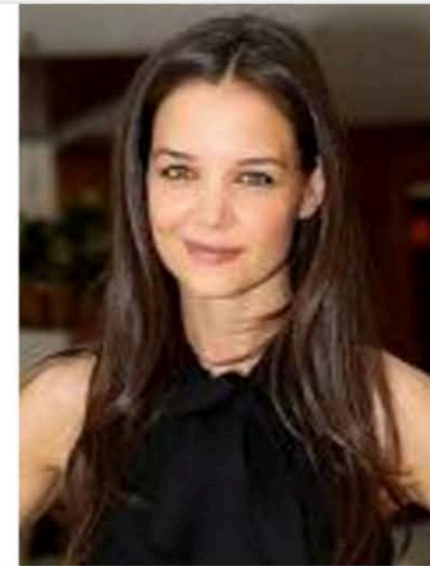
Search tools

About 9,540,000 results (1.44 seconds)

Tom Cruise / Spouse (2007)

Katie Holmes

m. 2006–2012



Movies and TV shows and overview

Feedback

Semantic Parsing

◆ Translate natural language queries into database/knowledge base retrieval queries

◆ Example 1

- “Who was Tom Cruise’s wife in 2007?”
- $\lambda x. \exists e. \text{Marriage}(x, e) \wedge \text{Spouse}(e, \text{TomCruise}) \wedge \text{Year}(\text{MarriageFrom}(e)) \leq 2007 \wedge \text{Year}(\text{MarriageTo}(e)) \geq 2007$

Knowledge Graph Answers



who won the nobel prize in literature in 2016



All

News

Images

Videos

Shopping

More ▾

Search tools

About 16,000,000 results (1.08 seconds)

Nobel Prize in Literature / Winners (2016)

Bob Dylan



Songs, quotes, and albums

Feedback

Web Answers

- ◆ Extract answers from web search results
- ◆ Better suited for
 - long tail questions
 - fresh answers

[All](#)[News](#)[Images](#)[Videos](#)[Shopping](#)[More](#) ▼[Search tools](#)

About 52,000,000 results (0.67 seconds)

Monarchy of Thailand / Current holder

Bhumibol Adulyadej



Bhumibol Adulyadej (Thai: ภูมิพลอดุลยเดช; rtps: Phumiphon Adunyadet; pronounced [pʰuː.mí.pʰon ʔa.dun.ja.dè:t] (listen); see full title below; 5 December 1927 – 13 October 2016), known as King Bhumibol the Great, was the ninth monarch of Thailand from the **Chakri Dynasty** as Rama IX.

[Bhumibol Adulyadej - Wikipedia](#)

https://en.wikipedia.org/wiki/Bhumibol_Adulyadej Wikipedia ▼



Quotes and overview



where did bob dylan grow up



All

Videos

Images

Maps

News

More ▾

Search tools

About 1,270,000 results (0.67 seconds)

Folk rock singer-songwriter Bob Dylan was born Robert Allen Zimmerman on May 24, 1941, in **Duluth, Minnesota**. While attending college, he began performing folk and country songs, taking the name "Bob Dylan."

[Bob Dylan - Songwriter, Singer - Biography.com](https://www.biography.com/people/bob-dylan-9283052)
www.biography.com/people/bob-dylan-9283052



[About this result](#) • [Feedback](#)



what instrument does bob dylan play



All

Shopping

News

Videos

Images

More ▾

Search tools

About 1,340,000 results (0.85 seconds)

guitar

Although he is often thought of as just playing **guitar**, harmonica, and singing, Dylan is equally skilled on the piano, and he has played most instruments at one point or another in his 40+ years in music.

[Bob Dylan - Biography - IMDb](#)

www.imdb.com/name/nm0001168/bio IMDb ▾

About this result • Feedback

[All](#)[Videos](#)[Images](#)[Shopping](#)[News](#)[More ▾](#)[Search tools](#)

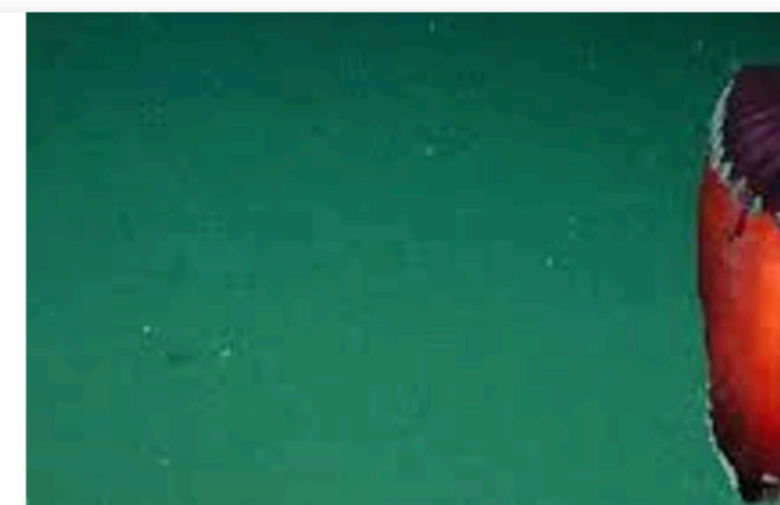
About 14,800,000 results (0.63 seconds)

approximately 36,200 feet

The deepest part of the ocean is called the Challenger Deep and is located beneath the western Pacific Ocean in the southern end of the Mariana Trench, which runs several hundred kilometers southwest of the U.S. territorial island of Guam. Challenger Deep is **approximately 36,200 feet** deep.

[How deep is the ocean? - NOAA's National Ocean Service](#)

oceanservice.noaa.gov/facts/oceandepth.html National Ocean Service ▾





what sleeping pills can you take when pregnant



All

Shopping

News

Images

Videos

More ▾

Search tools

About 12,800,000 results (0.57 seconds)

What sleeping pill is safe during pregnancy?

Tylenol PM is simply acetaminophen mixed with **benadryl** and both drugs alone are considered safe in pregnancy so the combination is also assumed to be a safe sleep aid. Any other sleep aids that are prescription needs to be discussed with your OB.

[Is it safe to take sleep aids while pregnant? | Parents](#)

www.parents.com/.../pregnancy...pregnant-life/is-it-safe-to-take-sleep-aids-while-pregna...

Search for: [What sleeping pill is safe during pregnancy?](#)

Search Engine vs Answer Engine

- ❖ Search Engine: Know where to look
- ❖ Answer Engine: Know what to look for



insert special characters in keynote



All

Videos

Images

News

Shopping

More ▾

Search tools

About 32,500 results (0.60 seconds)

Enter special characters and symbols

1. Click in the text where you want the character or symbol to appear.
2. Choose Edit > Special Characters to open the Characters Viewer.
3. Click an icon at the bottom of the Characters window to choose a category of characters (click the left or right arrows to see more categories).

More items...

[Keynote for Mac 6.0: Add text - Apple Support](https://support.apple.com/kb/PH16982)

<https://support.apple.com/kb/PH16982> Apple ▾

About this result • Feedback

Expected Answer Type

- ❖ A semantic type that the answer is expected to belong.
- ❖ Focus word: the word/phrase in a query that specifies the expected answer type.
 - what **enzyme** breaks down starch?
 - **how much** does a macbook air **weigh**
 - what is the **melting point** of paraffin wax
 - **annual rainfall** of beijing

Learning Answer Types from Naturally Annotated Data

❖ Numerical types

- (has|with) (a|an) TYPE of _____
- Example:
 - has a DIAMETER of 13 cm

❖ Entity types:

- TYPE(s), such as _____
- Example:
 - cities such as Beijing

Answer Type Example: annual rainfall

- ❖ The Zatecka Basin, the driest area, has an **annual rainfall** of **about 18 inches**.
- ❖ More than 80% of the continent has an **annual rainfall** of **less than 600 mm**;
- ❖ Cuzco with a mean average temperature of 10.7° C, and highest average monthly 12.1, has an **annual rainfall** of **804 mm**.
- ❖ along the western Ghats escarpment, has an **annual rainfall** of **about 5600 mm** which is towards the mid-range of rain stations in the area

Answer Type Example: sleeping pills

- ❖ There is little evidence that the newer generation sleeping pills such as Ambien or Lunesta are more effective than older **sleeping pills** such as **Dalmane** or ...
- ❖ Diphenhydramine is found in many popular over the counter **sleeping pills** such as **Tylenol PM**, Excedrin PM and Nytol.
- ❖ A newer class of non-benzodiazepine **sleeping pills** such as **eszopiclone** or zolpidem appears to be safe to use by patients with OSA

A Tale of Two DiDi Rides



Voice Assistants

- ❖ Siri
- ❖ Google Assistant
- ❖ Cortana
- ❖ 度秘
- ❖ 灵犀
- ❖ Amazon Echo/Alexa
- ❖ Viv
- ❖ Hound
- ❖ ...

Google Assistant

- ◆ Currently, it is mostly an integration of products already available on various Google properties.
 - Actions: reminder, alarm, photo and email lookup
 - Answers: open domain questions
 - Local info: restaurants, shops, gyms, ...
 - Sports info: athletes, teams, games, ...
 - Travel: airline, hotel
 - Translation
 - ...

show me email from dongyan

Here's what shows up in your Gmail

CNCC论坛的Discussion问题

ZHAO Dongyan Oct 17
各位老师，大家好！非常感谢大家受邀参加中国计算机大会（CNCC）第一天（20日周四）下午2：00举行的《自然语言理解与聊天...


CNCC论坛


ZHAO Dongyan Sep 28
各位老师好！感谢大家接受邀请参加10月20日下午的CNCC论坛——自然语言理解与聊天机器人。本次论坛将围绕自然语言...




Glad you like it

+ Say something... 😊 🎤

← 1.94 Mi Google Assistant Located in the Santa Cruz Mountains Preview Edition 
Cruz Mountains. The Pertino hotel is a half-mile from the HP ...

How deep is the ocean 

 Here's what I found on the web



approximately 36,200 feet

The deepest part of the ocean is called the Challenger Deep and is located beneath the western Pacific Ocean in the southern end of the Mariana Trench, which runs several hundred kilometers southwest of the U.S. territorial island of Guam. Challenger Deep is approximately 36,200 feet deep.

How deep is the ocean? - NOAA's National Ocean Service
[National Oceanic and Atmospheric Administration](#)

+ Say something...  



head coach of golden state warriors

Steve Kerr is the head coach of Golden State Warriors.

how about lakers

Here's the top Wikipedia result



Luke Walton

Jerry West was head coach of the Lakers for three seasons. Pat Riley coached the team to four championships in the 1980s. Phil Jackson has won five championships in two stints coached with the Lakers. Luke Walton is the Lakers' current head coach..

+ Say something... 😊 🗣️

[All](#)[News](#)[Images](#)[Maps](#)[Videos](#)[More ▾](#)[Search tools](#)

About 1,510,000 results (0.77 seconds)

Golden State Warriors / Head coach

Steve Kerr



Keith Smart was the head coach for the 2010–2011 season. Mark Jackson was the head coach from 2011 to 2014. **Steve Kerr** is the current head coach of the Warriors since the 2014–15 season.

[List of Golden State Warriors head coaches - Wikipedia](#)

https://en.wikipedia.org/wiki/List_of_Golden_State_Warriors_head_coaches Wikipedia ▾



More about Steve Kerr



how about lakers



All

News

Images

Videos

Shopping

More ▾

Search tools

About 1,190,000 results (0.67 seconds)

Los Angeles Lakers

Scores & Schedule

Thu, Oct 27	vs		Rockets	10:30 AM
Sat, Oct 29	@		Jazz	9:00 AM
Mon, Oct 31	@		Thunder	7:00 AM

All times are in China Standard Time



Schedule and scores

Restaurants near mountain view amphitheater

restaurants near mountain view amphitheater, sure.



The Voya Restaurant
★★★★☆
Spanish



Sunny Bowl
★★★★☆ \$
Korean



ViVe
★★★★
Mexican

Upscale

Chez TJ, here you go.



Chez TJ

Preview Edition



Chez TJ
★★★★☆ \$\$\$\$
French

how far is it

Here's your route

From My Location (Zhongguancun, Haidian, Beijing, China)
To Chez TJ



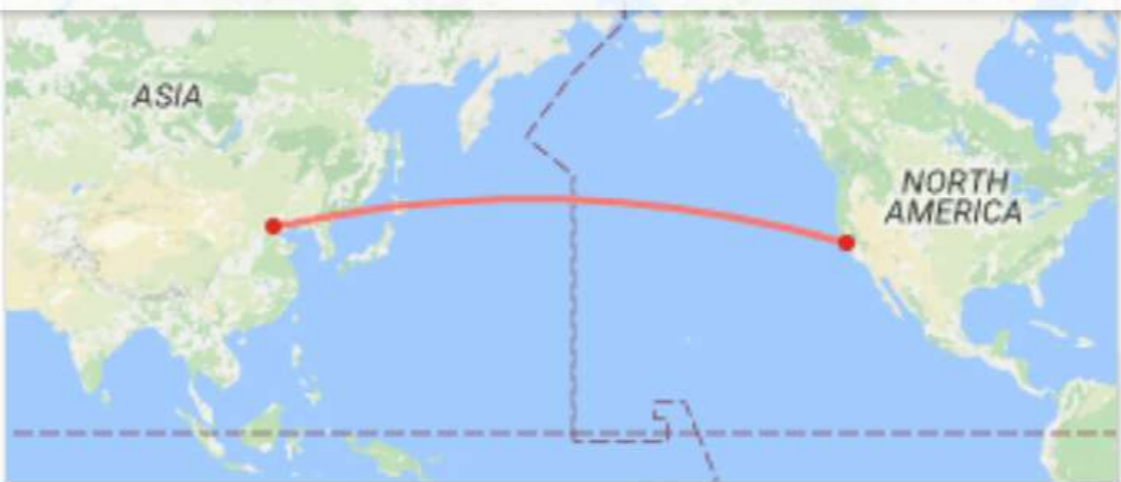
(9,548 km)

+ Say something...



Google Assistant

Preview Edition



(9,548 km)

how far is it from mountain view amphitheater

From the web

Shoreline Amphitheatre | Latest Events and Tickets | Mountain View ...

www.mountainviewamphitheater.com

The famous Shoreline Amphitheatre, Mountain View. Purchase tickets and view events for the Shoreline Amphitheatre.

+ Say something...



Lady gaga concerts

Here's what I found on the web

LADY GAGA / JOANNE
 Lady Gaga

American pop singer and songwriter. Includes biography, tour information, videos , ringtones, photos and a forum.

Schedule of presidential debate

I found this on the web

2016 Presidential Debate Schedule – 2016 Election Central
www.uspresidentialelectionnews.com > 2...

The dates and venues have been announced for the 2016 Presidential debates between Hillary Clinton and Donald ...

Search results News When was the last GOP debat

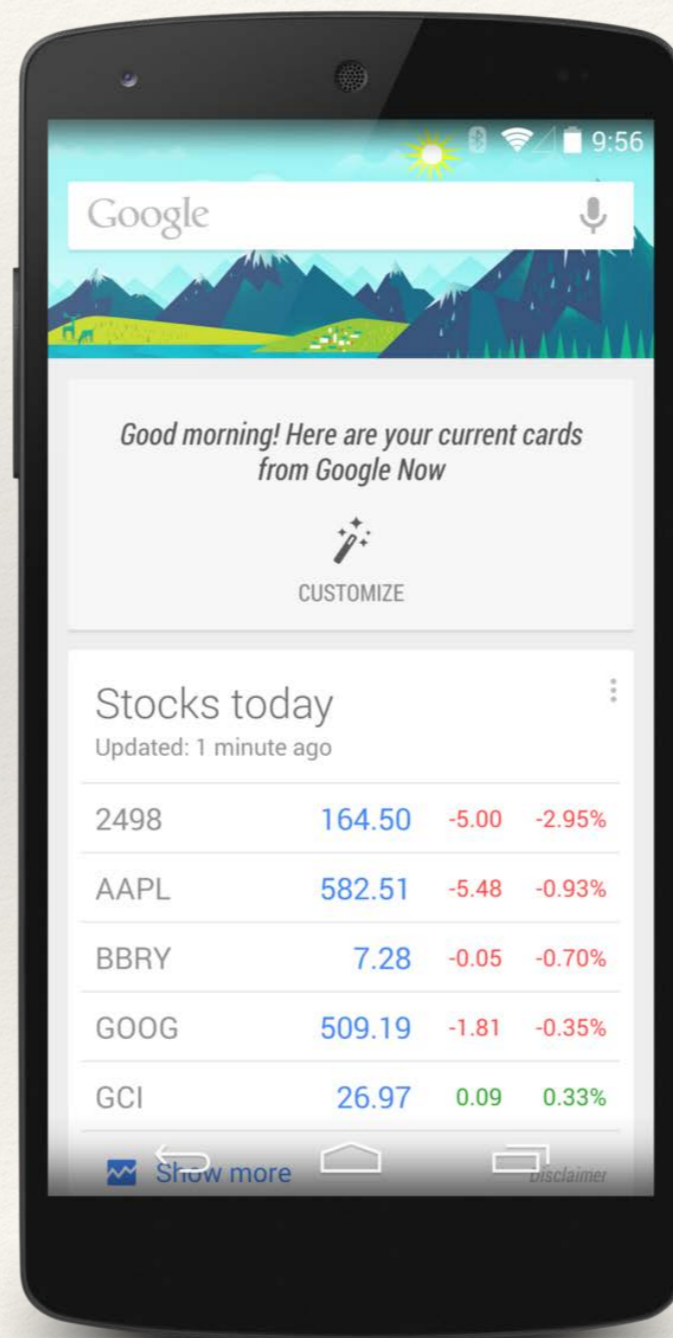
+ Say something...

Interface to OS and First Party Apps

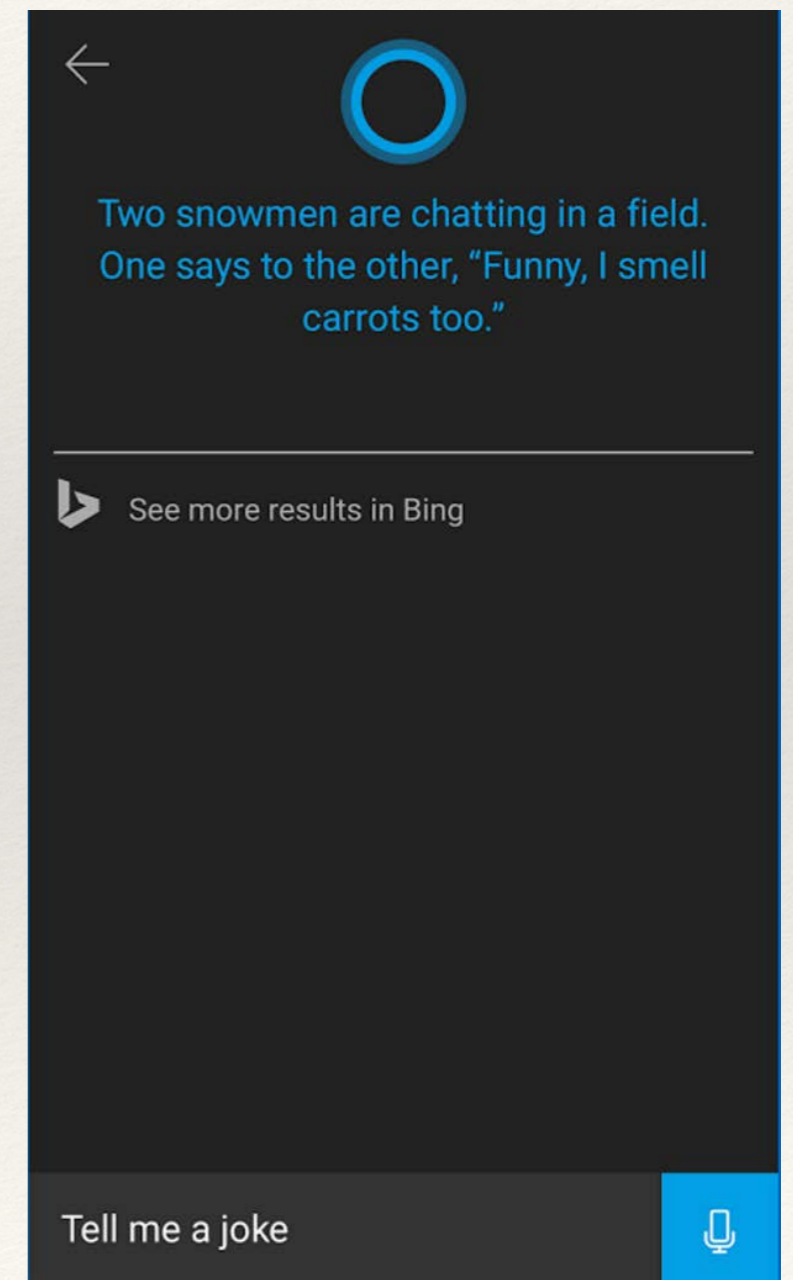
Siri



Google Assistant



Cortana



Siri API

❖ Siri API only works with six functionalities:

Ride booking

Messaging

Photo Search

Payments

VoIP Calling

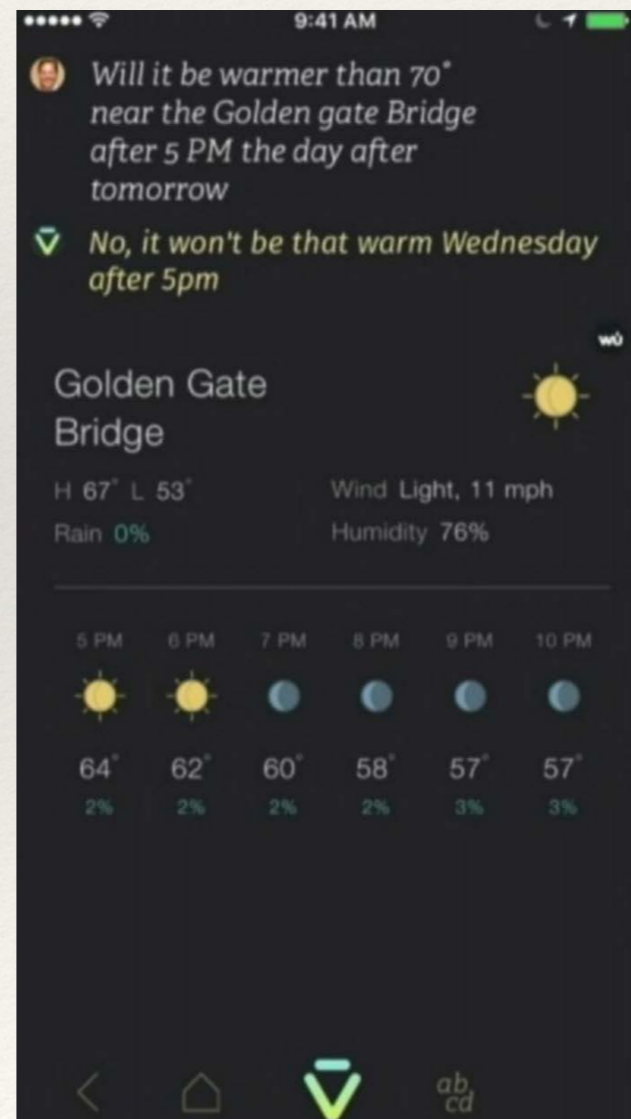
Workouts

Interface to Backend Services

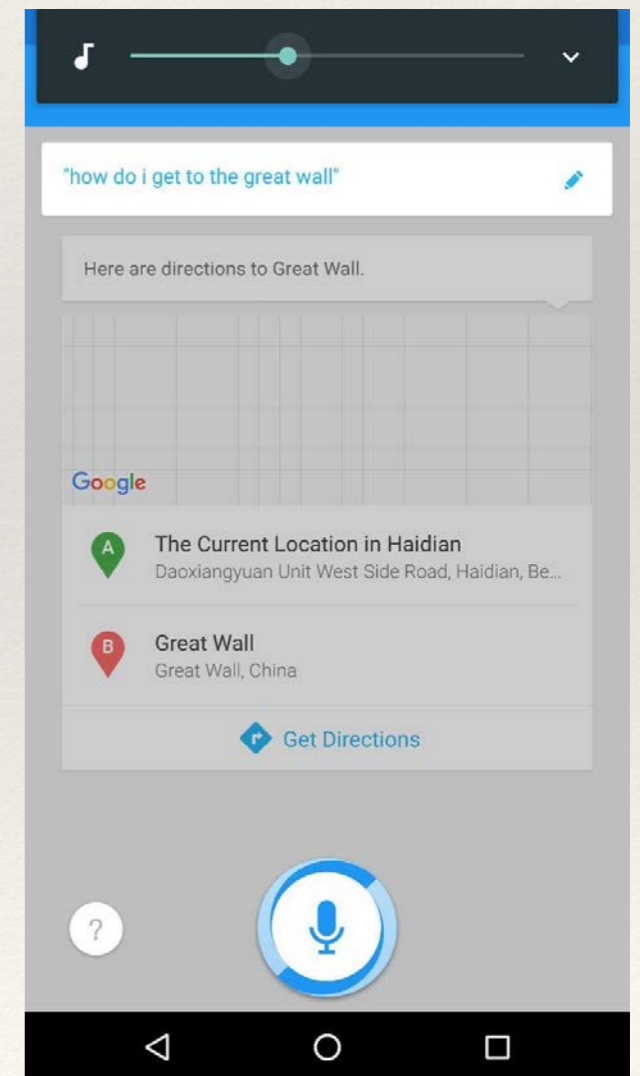
Amazon Echo



VIV

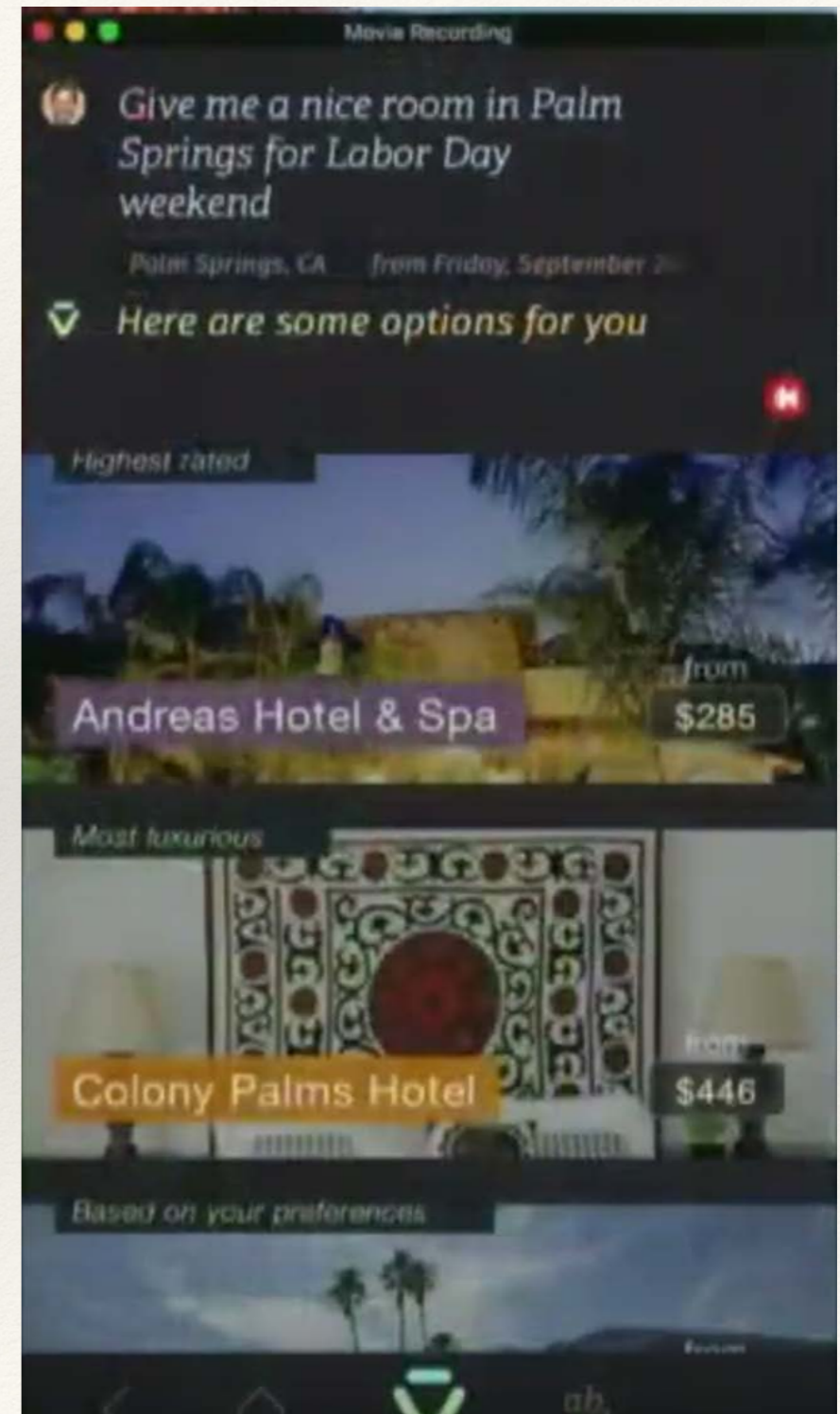


Hound



Viv

- ❖ Give me a nice room in Palm Springs for Labor Day weekend



携程

晚上11:35 0.00K/s 联通 4G

< 关键字/位置/品牌/酒店名 地图

可订 立即确认 携程自营 含早 在线付款 免费取消

 **北戴河海洋度假村**
4.1分 不错 60点评 高档型 2013年装修
距市中心5.4公里·海港区
休闲度假 海滨风光
环境不错 **¥2803**起

 **北戴河国际俱乐部**
4.4分 很好 1067点评 高档型 2011年装修
距市中心10.1公里·森林湿地公园
亲子时刻 休闲度假 礼 可返
很安静 最新预订:1小时前 **¥338**起

 **北戴河观海楼宾馆**
4.5分 很好 1663点评 高档型 2011年开业
距市中心11.1公里·鸽子窝, 奥林匹克公园
亲子时刻 休闲度假
风景很好 最新预订:1小时前 **¥400**起

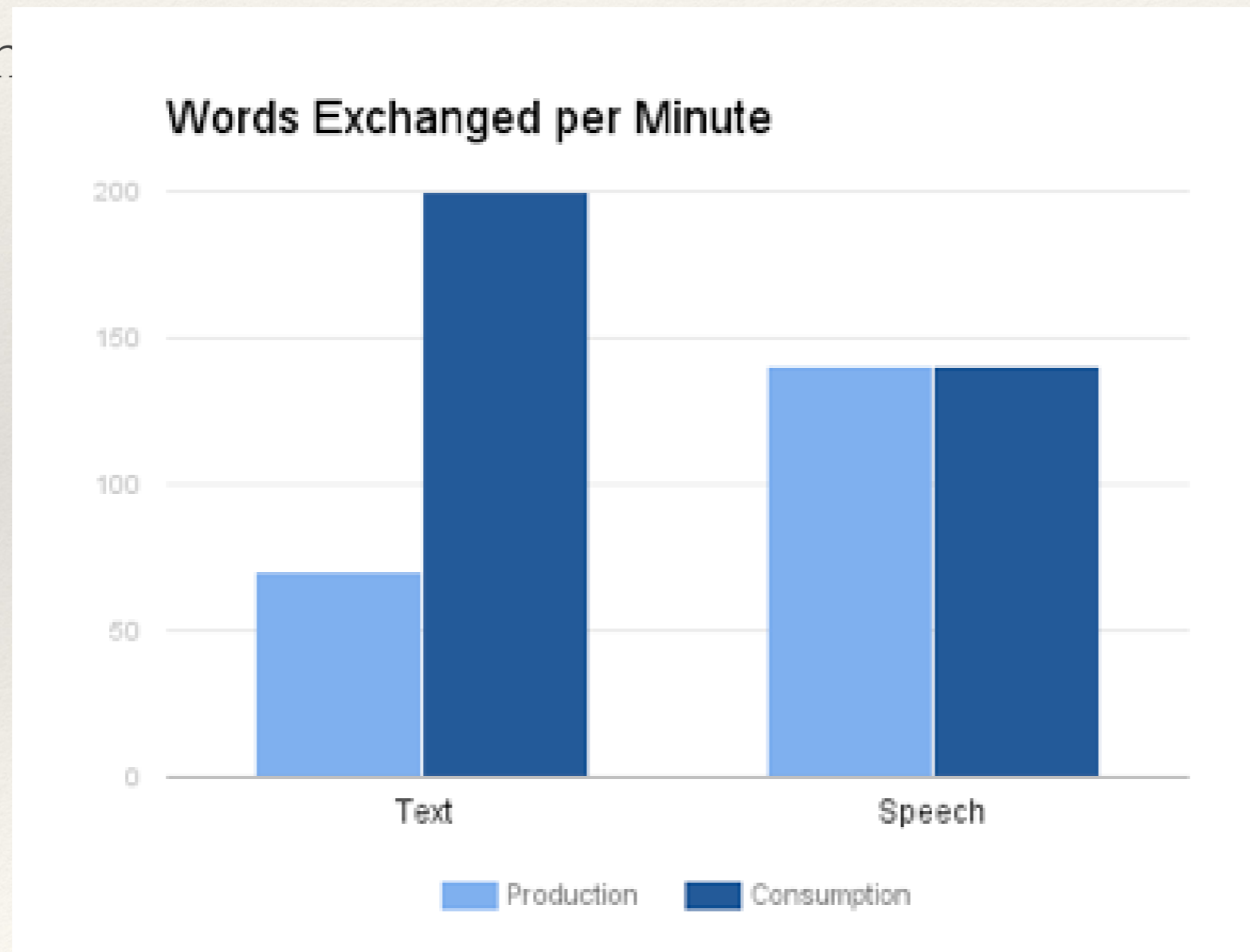
 **北戴河亿腾海景酒店**
4.3分 很好 148点评 高档型 2016年开业
距市中心11.1公里·鸽子窝, 奥林匹克公园
亲子时刻 休闲度假 闪住 特价 可返
位置好 最新预订:2小时前 **¥314**起

 **中国社会科学院北戴河培训中心(一区)**
4.2分 不错 372点评 高档型 2015年装修
距市中心5.4公里·海港区

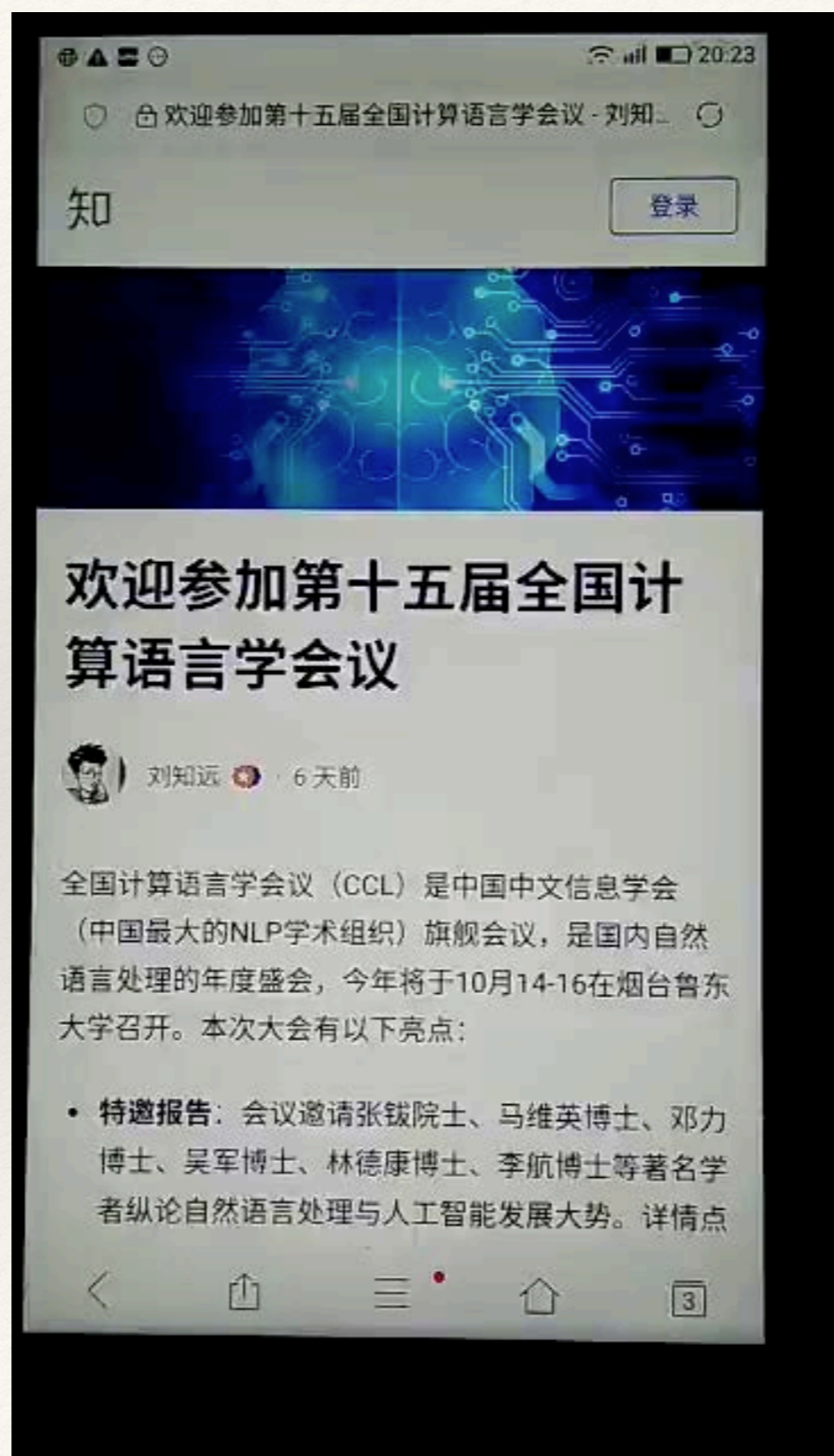
筛选 位置区域 四星/高档,五星/... 距离近→远

Communication Throughput

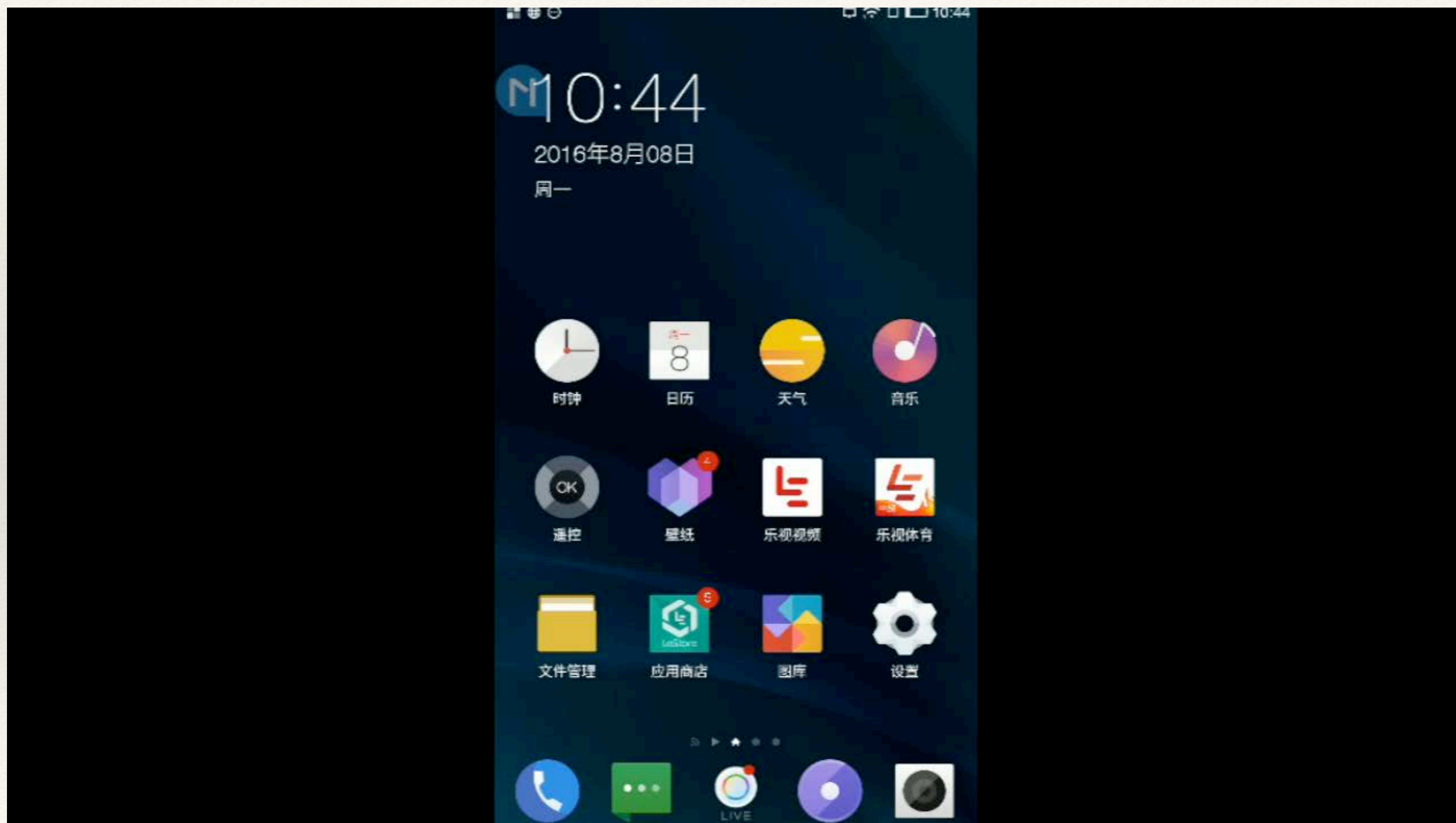
❖ Yao, Ch



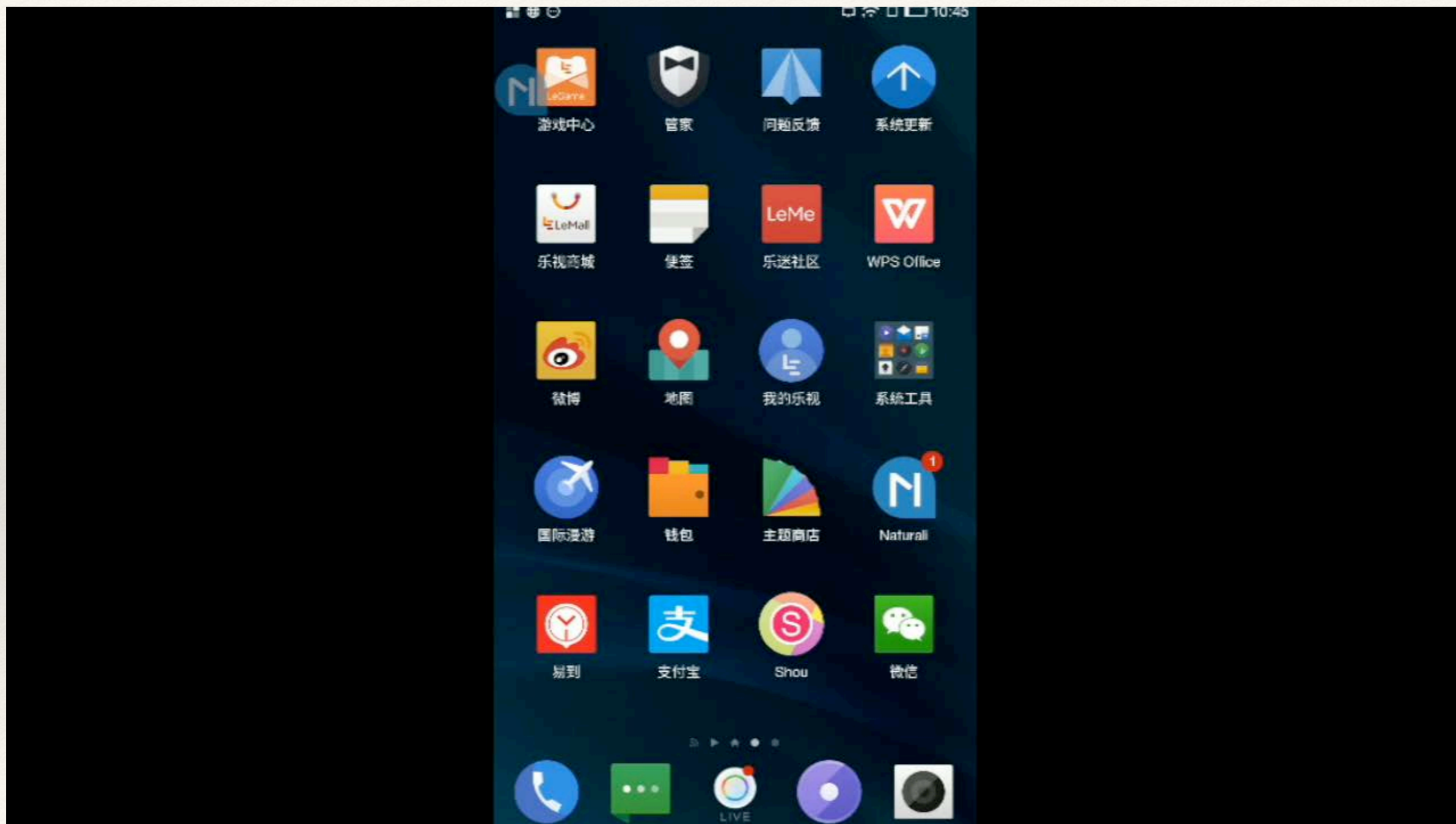
Naturali 小不点



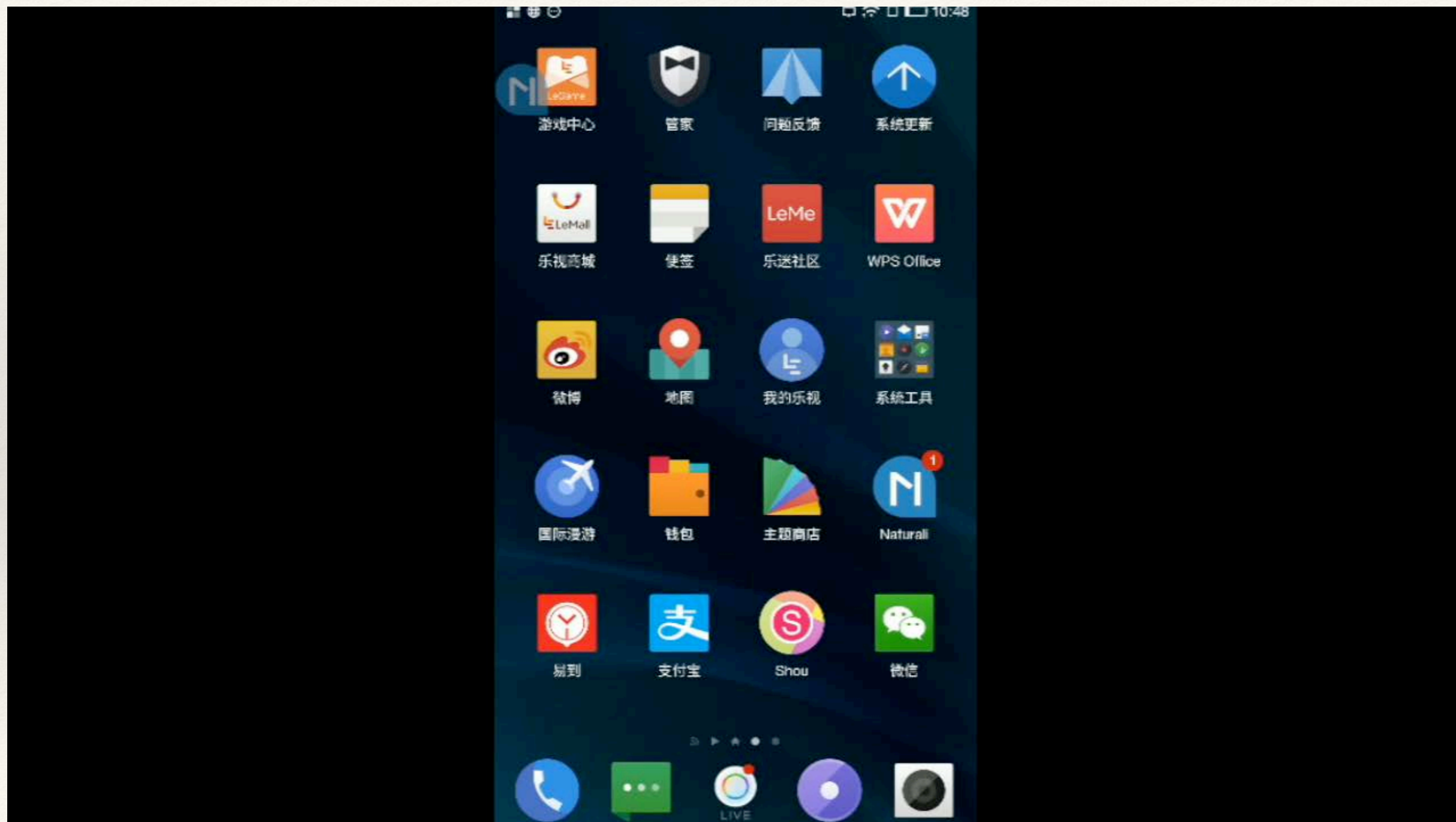
订机票



发微信



看视频



NATURALI

小不点，不用点