

The Art of the Possible

~~Jon Moore, Chief Software Architect (@jon_moore)~~

Jessica Sant, Vice President, Discovery Engineering (@jsant)

Ranga Muvavarirwa, Vice President, Entertainment Technology (@rangar)

About Comcast



xfinity **NBCUniversal**

**COMCAST
BUSINESS**



Comcast creates incredible technology and entertainment that connects millions of people to the moments and experiences that matter most.

Who are we?



Ranga Muvavarirwa
VP, Entertainment Technology
Comcast Cable
@rangar



Jon Moore
Chief Software Architect
Comcast Cable
@jon_moore

Who are we?



Ranga Muvavarirwa
VP, Entertainment Technology
Comcast Cable
[@rangar](https://twitter.com/rangar)



Jessica Sant
VP, Discovery Engineering
Comcast Cable
[@jsant](https://twitter.com@jsant)

Who were we?



Ranga Muvavarirwa
Principal Engineer
Comcast Interactive Media
[@rangar](https://twitter.com/rangar)

Photo of Ranga courtesy of Andy Diller.
CC BY 3.0 US: <https://creativecommons.org/licenses/by/3.0/us/>



Jessica Sant
Senior Manager, Engineering
Comcast Interactive Media
[@jsant](https://twitter.com@jsant)



2:28pm



Find Shows

Search TV & On Demand
Search all TV listings and On Demand programs.

Search TV & On Demand

Search & Record

HD

Movies

Premium Channels

Sports

Music

Kids

Pay-Per-View Events

Saved Searches

More ▾ Choices



Photo: <https://www.flickr.com/photos/levork/6190706649/>
CC BY-SA 2.0: <https://creativecommons.org/licenses/by-sa/2.0/>

Scope
Architecture
Impact
Delivery

Joint
Application
Design

S
A
I
D

“SAD”

J
A
D

2017

January							February							March						
Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa
1	2	3	4	5	6	7			1	2	3	4			1	2	3	4		
8	9	10	11	12	13	14	5	6	7	8	9	10	11	5	6	7	8	9	10	11
15	16	17	18	19	20	21	12	13	14	15	16	17	18	12	13	14	15	16	17	18
22	23	24	25	26	27	28	19	20	21	22	23	24	25	19	20	21	22	23	24	25
29	30	31			26	27	28			26	27	28	29	30	31					
April							May							June						
Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa
						1			1	2	3	4	5	6				1	2	3
2	3	4	5	6	7	8	7	8	9	10	11	12	13	4	5	6	7	8	9	10
9	10	11	12	13	14	15	14	15	16	17	18	19	20	11	12	13	14	15	16	17
16	17	18	19	20	21	22	21	22	23	24	25	26	27	18	19	20	21	22	23	24
23	24	25	26	27	28	29	28	29	30	31				25	26	27	28	29	30	
30																				
July							August							September						
Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa
						1			1	2	3	4	5				1	2		
2	3	4	5	6	7	8	6	7	8	9	10	11	12	3	4	5	6	7	8	9
9	10	11	12	13	14	15	13	14	15	16	17	18	19	10	11	12	13	14	15	16
16	17	18	19	20	21	22	20	21	22	23	24	25	26	17	18	19	20	21	22	23
23	24	25	26	27	28	29	27	28	29	30	31			24	25	26	27	28	29	30
30	31																			
October							November							December						
Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa
1	2	3	4	5	6	7			1	2	3	4				1	2			
8	9	10	11	12	13	14	5	6	7	8	9	10	11	3	4	5	6	7	8	9
15	16	17	18	19	20	21	12	13	14	15	16	17	18	10	11	12	13	14	15	16
22	23	24	25	26	27	28	19	20	21	22	23	24	25	17	18	19	20	21	22	23
29	30	31			26	27	28	29	30					24	25	26	27	28	29	30
														31						

2017																			
January					February					March									
Su	Mo	Tu	We	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
15	16	17	18	19	20	21	12	13	14	15	16	17	18	19	20	21	22	23	24
22	23	24	25	26	27	28	19	20	21	22	23	24	25	19	20	21	22	23	24
29	30	31				26	27	28						26	27	28	29	30	31
April					May					June									
Su	Mo	Tu	We	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa
					1	1	2	3	4	5	6	7	1	2	3	4	5	6	7
2	3	4	5	6	7	8	7	8	9	10	11	12	13	4	5	6	7	8	9
9	10	11	12	13	14	15	14	15	16	17	18	19	20	11	12	13	14	15	16
16	17	18	19	20	21	22	21	22	23	24	25	26	27	18	19	20	21	22	23
23	24	25	26	27	28	29	28	29	30	31				25	26	27	28	29	30
30	31																		
July					August					September									
Su	Mo	Tu	We	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa
					1	1	2	3	4	5	6	7	3	4	5	6	7	8	9
2	3	4	5	6	7	8	6	7	8	9	10	11	12	10	11	12	13	14	15
9	10	11	12	13	14	15	13	14	15	16	17	18	19	17	18	19	20	21	22
16	17	18	19	20	21	22	20	21	22	23	24	25	26	17	18	19	20	21	22
23	24	25	26	27	28	29	27	28	29	30	31			24	25	26	27	28	29
30	31																		
October					November					December									
Su	Mo	Tu	We	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa
1	2	3	4	5	6	7	5	6	7	8	9	10	11	3	4	5	6	7	8
8	9	10	11	12	13	14	12	13	14	15	16	17	18	10	11	12	13	14	15
15	16	17	18	19	20	21	12	13	14	15	16	17	18	17	18	19	20	21	22
22	23	24	25	26	27	28	19	20	21	22	23	24	25	17	18	19	20	21	22
29	30	31				26	27	28	29	30				24	25	26	27	28	29

2018																							
January						February						March											
Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa			
	1	2	3	4	5	6		1	2	3	4	5	6		1	2	3	4	5	6	7		
7	8	9	10	11	12	13	4	5	6	7	8	9	10	4	5	6	7	8	9	10	11		
14	15	16	17	18	19	20	11	12	13	14	15	16	17	11	12	13	14	15	16	17	18		
21	22	23	24	25	26	27	18	19	20	21	22	23	24	18	19	20	21	22	23	24	25	26	
28	29	30	31				25	26	27	28				25	26	27	28	29	30	31			
April						May						June											
Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa			
1	2	3	4	5	6	7		1	2	3	4	5			1	2	3	4	5	6	7	8	
8	9	10	11	12	13	14	6	7	8	9	10	11	12	3	4	5	6	7	8	9	10	11	
15	16	17	18	19	20	21	13	14	15	16	17	18	19	10	11	12	13	14	15	16	17	18	
22	23	24	25	26	27	28	20	21	22	23	24	25	26	17	18	19	20	21	22	23	24	25	
29	30						27	28	29	30	31			24	25	26	27	28	29	30			
July						August						September											
Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa			
1	2	3	4	5	6	7		1	2	3	4			2	3	4	5	6	7	8	9	10	
8	9	10	11	12	13	14	5	6	7	8	9	10	11	9	10	11	12	13	14	15	16	17	
15	16	17	18	19	20	21	12	13	14	15	16	17	18	16	17	18	19	20	21	22	23	24	
22	23	24	25	26	27	28	19	20	21	22	23	24	25	23	24	25	26	27	28	29	30	31	
29	30	31					26	27	28	29	30	31											
October						November						December											
Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa			
	1	2	3	4	5	6		1	2	3	4			2	3	4	5	6	7	8	9	10	
7	8	9	10	11	12	13	4	5	6	7	8	9	10	9	10	11	12	13	14	15	16	17	
14	15	16	17	18	19	20	11	12	13	14	15	16	17	16	17	18	19	20	21	22	23	24	
21	22	23	24	25	26	27	18	19	20	21	22	23	24	21	22	23	24	25	26	27	28	29	
28	29	30	31				25	26	27	28	29	30		23	24	25	26	27	28	29	30		

January							February							March						
Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa
6	7	8	9	10	11	12	3	4	5	6	7	8	9	1	2	3	4	5	6	7
13	14	15	16	17	18	19	10	11	12	13	14	15	16	10	11	12	13	14	15	16
20	21	22	23	24	25	26	17	18	19	20	21	22	23	17	18	19	20	21	22	23
27	28	29	30	31			24	25	26	27	28			24	25	26	27	28	29	30
April							May							June						
Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa
1	2	3	4	5	6		1	2	3	4				2	3	4	5	6	7	8
7	8	9	10	11	12	13	5	6	7	8	9	10	11	9	10	11	12	13	14	15
14	15	16	17	18	19	20	12	13	14	15	16	17	18	16	17	18	19	20	21	22
21	22	23	24	25	26	27	19	20	21	22	23	24	25	23	24	25	26	27	28	29
28	29	30					26	27	28	29	30	31		23	24	25	26	27	28	29
July							August							September						
Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa
1	2	3	4	5	6									1	2	3	4	5	6	7
7	8	9	10	11	12	13	4	5	6	7	8	9	10	8	9	10	11	12	13	14
14	15	16	17	18	19	20	11	12	13	14	15	16	17	15	16	17	18	19	20	21
21	22	23	24	25	26	27	18	19	20	21	22	23	24	22	23	24	25	26	27	28
28	29	30	31				25	26	27	28	29	30	31	29	30					
October							November							December						
Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa
1	2	3	4	5	6									1	2	3	4	5	6	7
6	7	8	9	10	11	12	3	4	5	6	7	8	9	8	9	10	11	12	13	14
13	14	15	16	17	18	19	10	11	12	13	14	15	16	15	16	17	18	19	20	21
20	21	22	23	24	25	26	17	18	19	20	21	22	23	22	23	24	25	26	27	28
27	28	29	30	31			24	25	26	27	28	29	30	29	30	31				

Featured Skills & Endorsements



Practitioners

practices

time + \$

results

Champions

Investors

Practitioners



Culture

Champions

Investors

a succession...of successes

a succession...of successes

cim COMCAST
INTERACTIVE
MEDIA®

Office Space: *Building trust*

Startup to Core Business!







Photo: Tom Blaxland. Used with permission.



dev

QA

ops

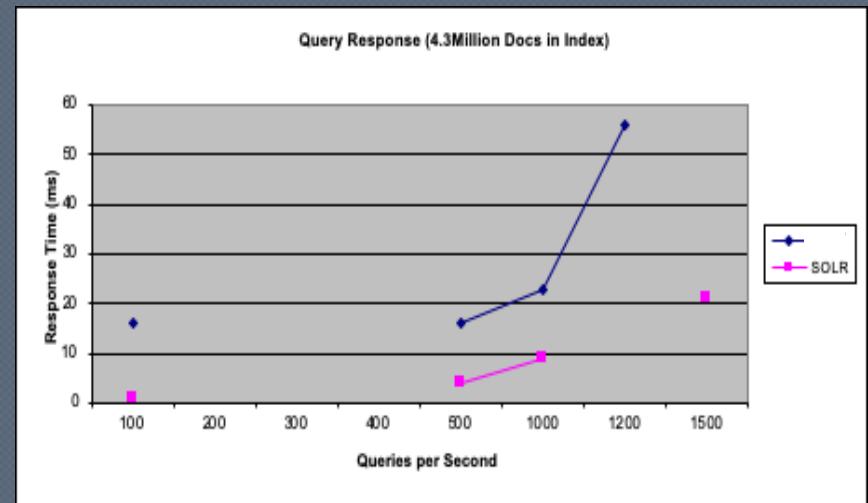
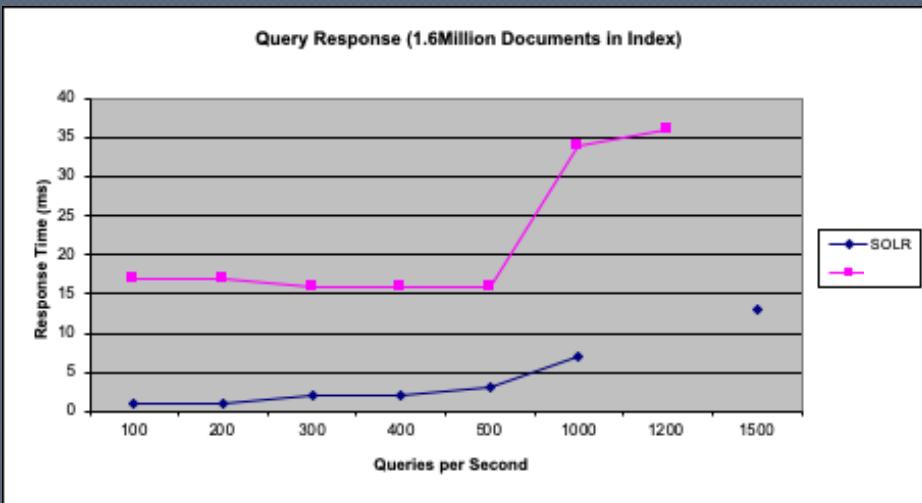


Photos: Tom Blaxland. Used with permission.

Challenging the Status Quo: *Leaning into Open Source*

Challenging the Status Quo

Cost benefit comparisons between COTS and OS



Leaning into Open Source

Early support for OS contributions



Lucene - Core / LUCENE-759
Add n-gram tokenizers to contrib/analyzers

Details

Type:	+ Improvement	Status:	RESOLVED
Priority:	Minor	Resolution:	Fixed
Affects Version/s:	None	Fix Version/s:	None

Description
It would be nice to have some n-gram-capable tokenizers in contrib/analyzers. Patch coming shortly.

Attachments

- LUCENE-759.patch
- LUCENE-759.patch
- LUCENE-759.patch
- LUCENE-759-filters.patch

Issue Links
is related to

- + SOLR-81 Add Query Spellchecker functionality

Solr / SOLR-81
Add Query Spellchecker functionality

Details

Type:	+ New Feature	Status:	CLOSED
Priority:	Minor	Resolution:	Fixed
Affects Version/s:	None	Fix Version/s:	1.2

Description
Use the simple approach of n-gramming outside of Solr and indexing n-gram documents. For example:

```
<doc>
<field name="word">lettuce</field>
<field name="start3">let</field>
<field name="gram3">let ett ttu tuc ue</field>
<field name="end3">ue</field>
<field name="start4">lett</field>
<field name="gram4">lett ett ttu tuc ue</field>
<field name="end4">tue</field>
</doc>
```

See:
<http://www.mail-archive.com/solr-user@lucene.apache.org/msg01254.html>
Java clients: [SOLR-29](#) (add delete commit optimize), [SOLR-30](#) (search)

[Full TV Episodes](#)[Full Movies](#)[What's On TV](#)[News & Gossip](#) Search Full TV & Movies

SEARCH

BRITTANY MURPHY DIES

Clueless star passes away after suffering full cardiac arrest.

FRIENDS

Christmas Marathon! Ring in the Holidays with your favorites.

DOLLHOUSE

New! Echo becomes trapped in her worst nightmare.

CSI

Latest! The team investigates a bizarre suicide pact.

 PLAY**Favorite Full Episodes**SEE ALL **Celeb News**

ADVERTISEMENT

Popular TV News**Top Stories****Most Discussed** 'Survivor: Samoa' Winner Revealed  28

Order
Of
Magnitude

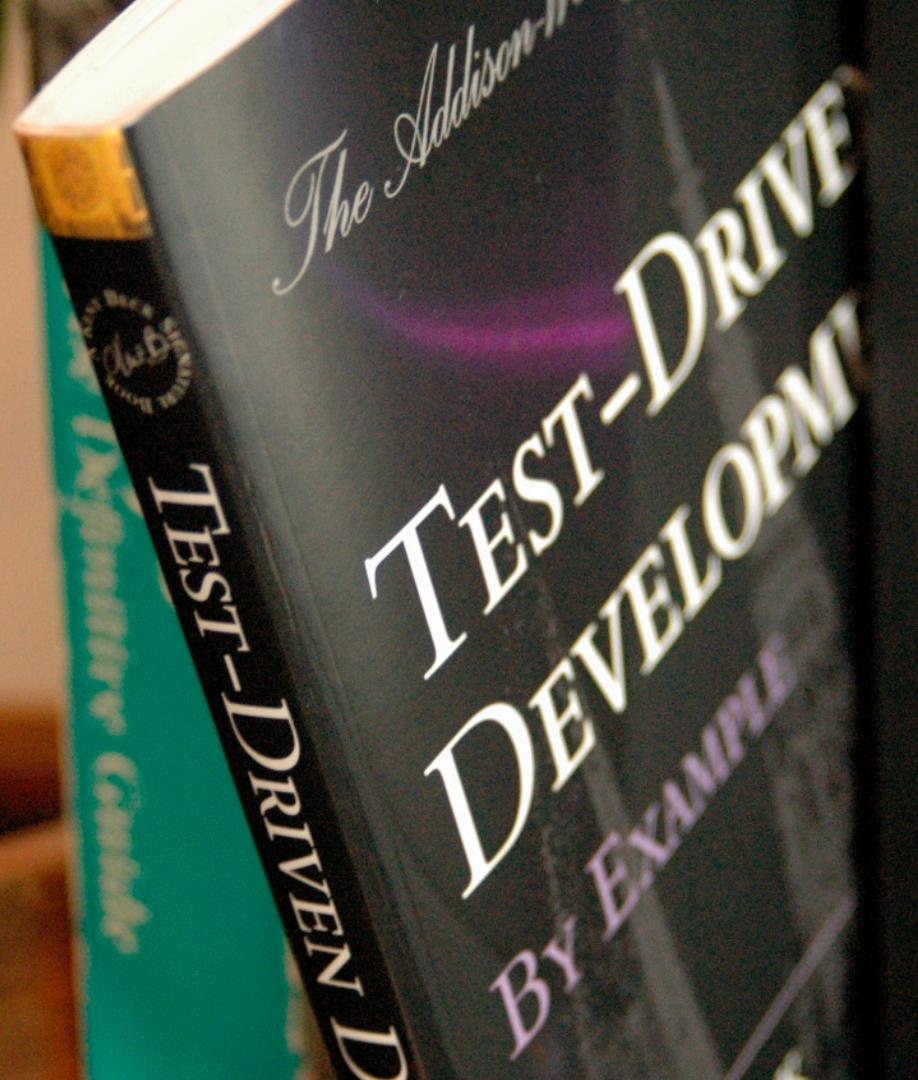
O
O
M

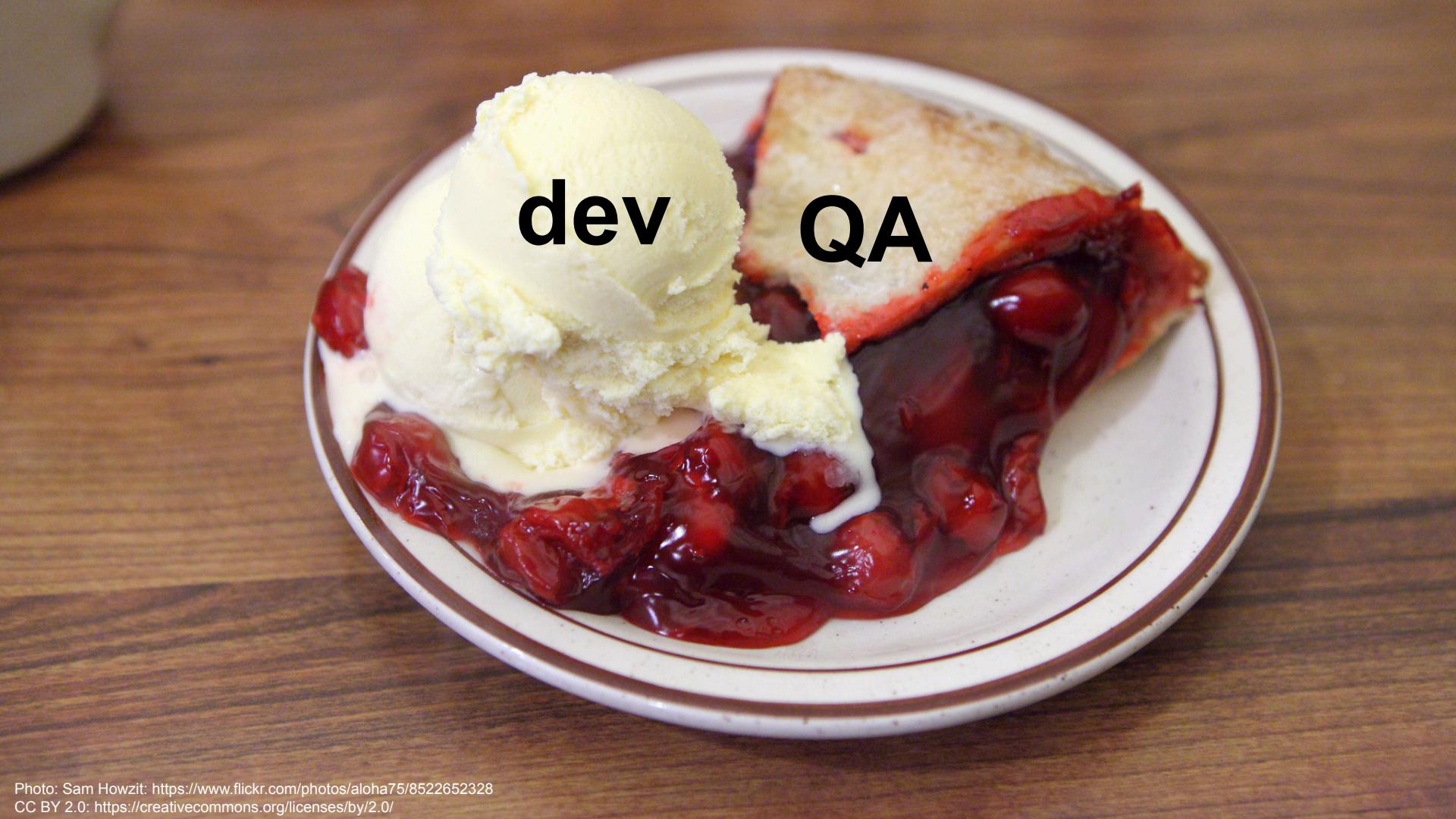
“OOM”



Photo: <https://www.flickr.com/photos/rhian/10842493396/>
CC BY 2.0: <https://creativecommons.org/licenses/by/2.0/>

ERDOK



A slice of pie with ice cream and cherries, with the words "dev QA" overlaid.

dev QA

The Addison-Wesley Signature Series

CONTINUOUS DELIVERY

RELIABLE SOFTWARE RELEASES THROUGH BUILD,
TEST, AND DEPLOYMENT AUTOMATION

JEZ HUMBLE
DAVID FARLEY



Foreword by Martin Fowler



A MARTIN FOWLER SIGNATURE BOOK

xfinity



xfinity



xfinity



xfinity



xfinity



xfinity





Concourse

 Say "ESPN3" for Live Sports

4:30p 46 °F 



xfinity flex



Search



Library



Watch



Listen



Apps



Today



Account

notes on culture

collaboration



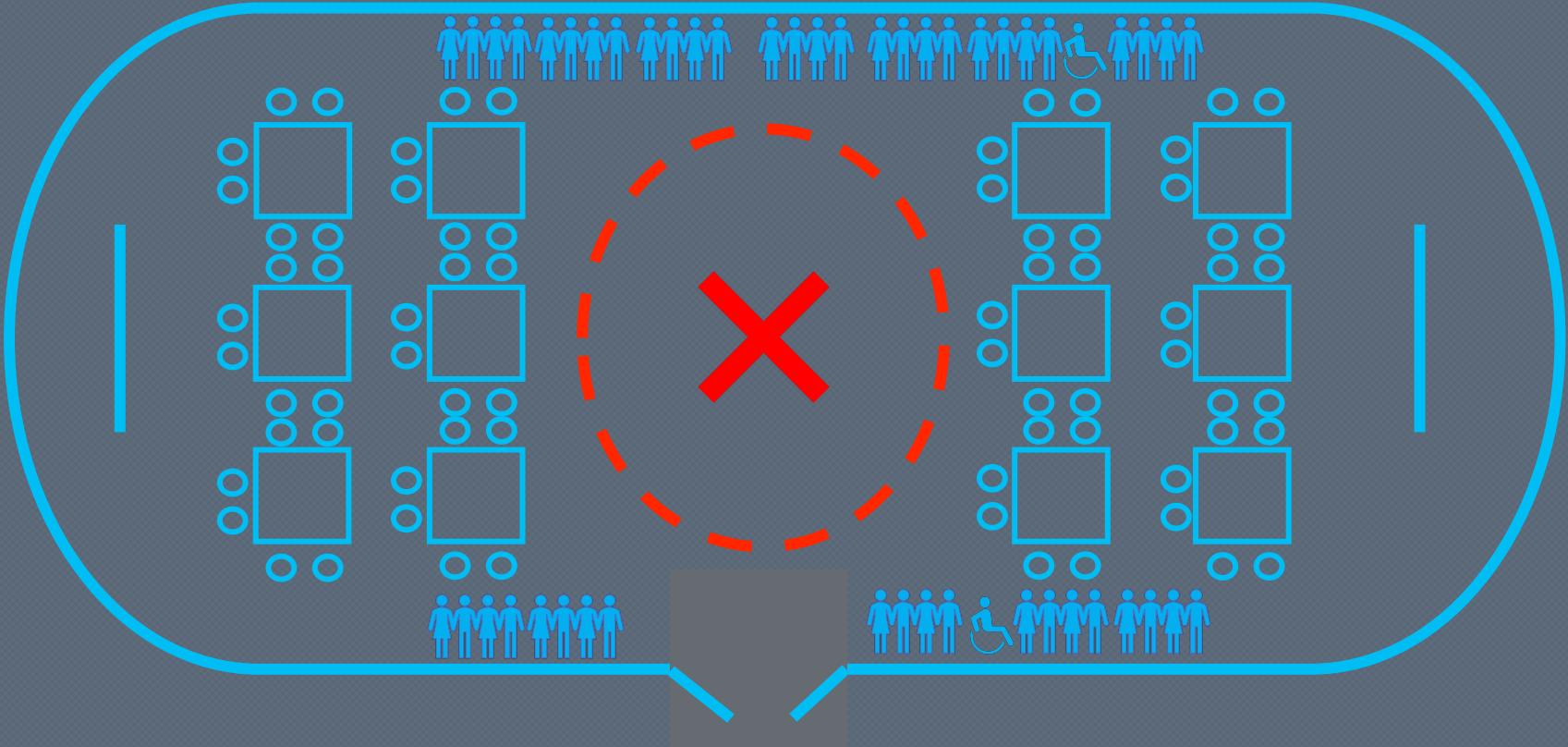
Photo courtesy of Sean Krause.

sharing credit



Photo: Tom Blaxland. Used with permission.

buy-in





2:28pm



Find Shows

Search TV & On Demand
Search all TV listings and On Demand programs.

Search TV & On Demand

Search & Record

HD

Movies

Premium Channels

Sports

Music

Kids

Pay-Per-View Events

Saved Searches

More ▾ Choices



A screenshot from an Xfinity Home Tips guide. The top right corner shows the time 9:45a / 54°F. The main content area features a large image of a cartoon dog's head with its mouth open, overlaid with the text "Xfinity Home, all lights off". To the right is a digital remote control. Below the image is the text "Adjust the Lighting" and instructions: "Press the mic on your Voice Remote and say 'Xfinity Home, all lights off' or 'Xfinity Home, turn living room light blue' during your next dance off." At the bottom left is a circular left arrow icon, and at the bottom right is a circular right arrow icon. The bottom center shows the page number 3 / 4.





COMCAST

Photos courtesy of Neil Epstein.

Practitioners



Culture

Champions

Investors