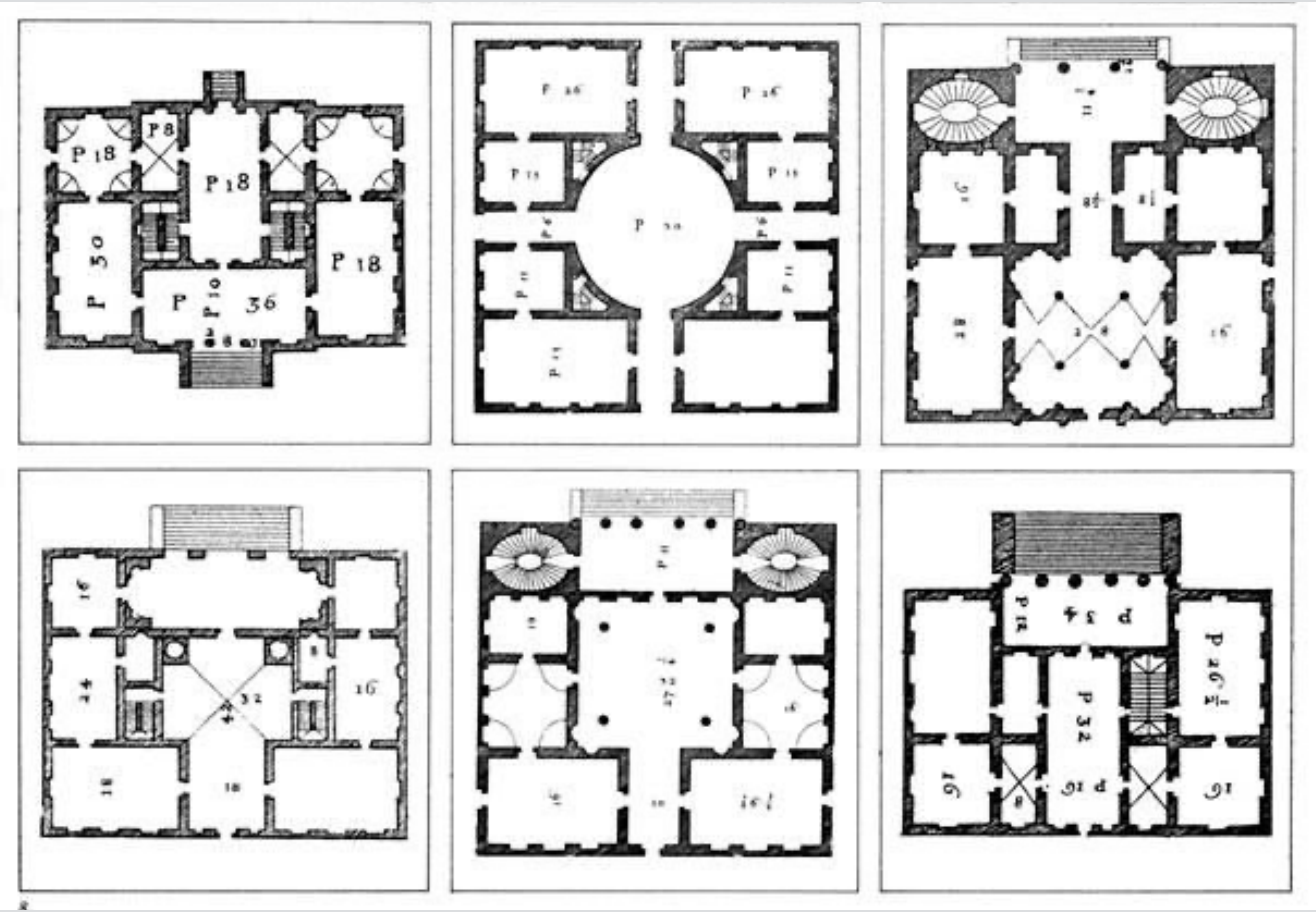
finding structure in software

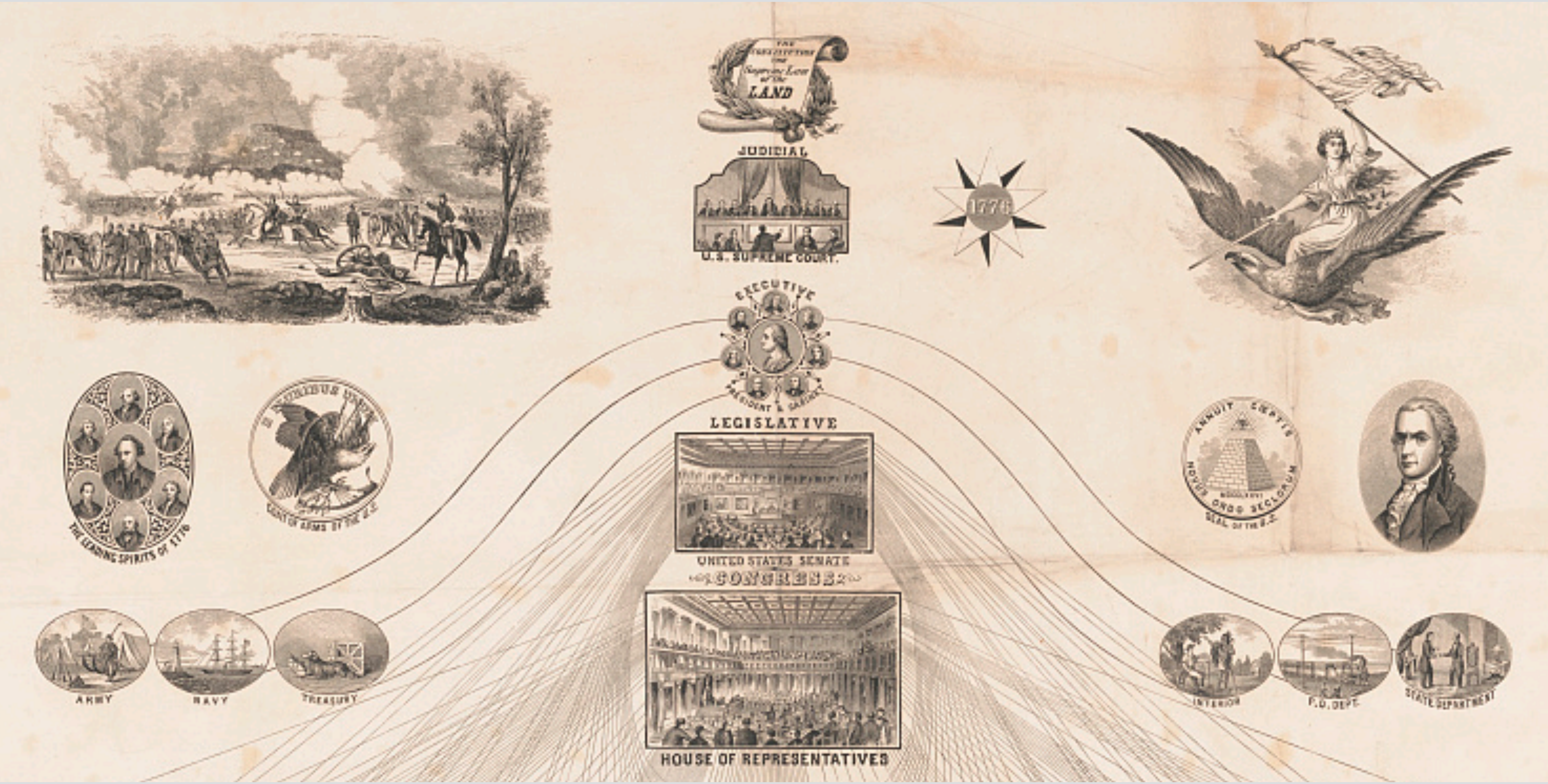
Daniel Jackson, MIT CSAIL · Nasa Formal Methods 2022 · May 26, 2022

we use structure
to understand
artifacts

villa designs (andrea palladio, c. 1570)



american federal government (1864)



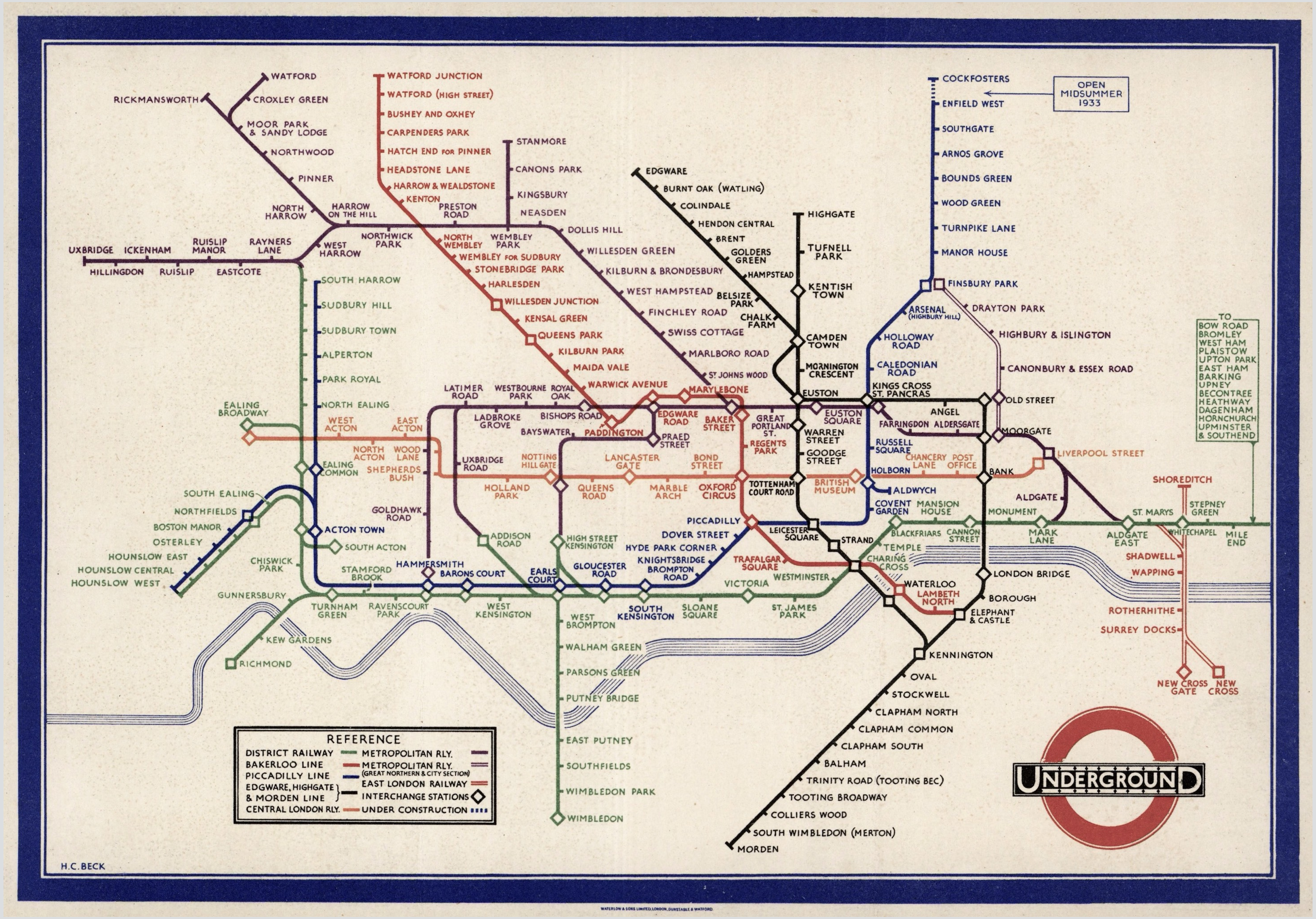
periodic table (mendeleev, c. 1870)

Естественная система элементовъ Д. Менделѣева.

		Группа I.	Группа II.	Группа III.	Группа IV.	Группа V.	Группа VI.	Группа VII.	Группа VIII. (переходъ къ I)			
	Высшій окиселъ образующій соли:	R^2O	R^2O^2 или RO	R^2O^3	R^2O^4 или RO^2	R^2O^5	R^2O^6 или RO^3	R^2O^7	R^2O^8 или RO^4			
		H=1 $H^2O_\wedge, HH_\wedge, HCl_\wedge$ $H^3N_\wedge, H^4C_\wedge, ROH.$		——	RH^4	RH^3	RH^2	RH				H=1 HX
	Типичес. Рядъ	Li=7 $LiCl, LiOH, Li^2O.$ $LiX, Li^2CO^3_*$	Be=9,4 $BeCl^2, BeO_*$ $Be^3Al^2Si^6O^{18}_*$	B=11 $BCl^3_\wedge, B^2O^3, BN_*$ $B^4Na^2O^7, BF^3_\wedge$	C=12 $CH^4_\wedge, C^nH^{2n+2}_\wedge$ $CO_\wedge, CO^2_\wedge, CO^3M^2_*$	N=14 $NH^3_\wedge, NH^4Cl_\wedge, N^2O_\wedge$ $NO_\wedge, NO^3M, CNM.$	O=16 $OH^2_\wedge, O^2C_\wedge, O^2_\wedge, O^3_\wedge$ $OM^2, O^nR, HOR.$	F=19 $FH_\wedge, BF^3_\wedge, SiF^4_\wedge$ $CaF^2_*, KF, KHF^2.$				
Періодъ 1-й.	Рядъ 1.	Na=23 $NaCl, NaHO, Na^2O$ Na^2SO^4, Na^2CO^3	Mg=24 $MgCl^2, MgO_*, MgCO^3_*$ $MgSO^4, MgNH^4PO^4_*$	Al=27,3 $Al^2Cl^6_\wedge, Al^2O^3_*$ $KAlS^2O^8 12H^2O.$	Si=28 $SiH^4_\wedge, SiCl^4_\wedge, SiH^2F^6$ $KAlSi^3O^8_*, SiO^2_*$	P=31 $PH^3_\wedge, PCl^3_\wedge, PCl^5_\wedge$ $P^2O^3_\wedge, P^2O^5, Ca^3P^2O^8_*$	S=32 $SH^2_\wedge, SM^2, S^nM^2$ $SO^2_\wedge, SO^2X^2, Ba^2SO^4_*$	Cl=35,5 $ClH_\wedge, ClM, ClCl_\wedge$ $ClOH, ClO^4H_\wedge, AgCl_*$				
	Рядъ 2.	K=39 KCl, KOH, K^2O $KNO^3, K^2PtCl^6_*, K^2SiF^6_*$	Ca=40 $CaSO^4_*, CaOnSiO^2_*$ $CaCl^2, CaO_*, CaCO^3_*$	—— ?44=Eb?	Ti=48(50?) $TiCl^4, TiO^2_*, Ti^2O^3_*$ $FeTiO^3_*, TiOSO^4$	V=51 $VOCl^3, V^2O^5, VO^2_*$ $Pb^3V^2O^8_*, VO_*$	Cr=52 $CrCl^3_*, CrCl^2, Cr^2O^3_*$ $CrO^3, K^2CrO^4, CrO^2Cl^2_\wedge$	Mn=55 $MnK^2O^4, MnKO^4$ $MnCl^2, MnO_*, MnO^2_*$	Fe=56 FeK^2O^4, FeS^2_* $FeO_*, Fe^2O^3_*$ FeK^4Cy^6	Co=59 CoX^2, CoX^3 $CoX^3 5NH^3$ CoK^3Cy^6	Ni=59 NiX^2, NiO_* $NiSO^4 6H^2O$ NiK^2Cy^4	Cu=63 CuX, CuX^2, CuH_* Cu^2O_*, CuO_* $CuKCy^2$
Періодъ 2-й.	Рядъ 3.	Cu=63 CuX, CuX^2	Zn=65 $ZnCl^2, ZnO_*, ZnCO^3_*$ $ZnSO^4, ZnEt^2_\wedge$	—— ?68=El?	—— ?72=Es? ?Il, EsO^2?	As=75 $AsH^3, AsCl^3_\wedge, As^4O^6_\wedge$ $As^2O^5, As^2S^3_*$	Se=78 $SeH^2_\wedge, SeO^2, SeO^3$ SeM^2, SeM^2O^4	Br=80 $BrH_\wedge, BrM,$ $BrO^3M, BrAg_*$				
	Рядъ 4.	Rb=85 $RbCl, RbOH.$ $Rb^2PtCl^6_*$	Sr=87 $SrCl^2, SrO, SrH^2O^2$ $SrSO^4_*, SrCO^3_*$	—— ?88=Yt?(92) ?$Yt^2O^3_*, YtX^3$?	Zr=90 $ZrCl^4_\wedge, ZrO^2_*, ZrX^4.$	Nb=94 $NbCl^5_\wedge, Nb^2O^5$ $Nb^2O^5, NbOK^2F^5$	Mo=96 $MoCl^4_\wedge, MoS^2_*, MoO^3_*$ $M^2MoO^4 nMoO^3$	—— 100	Ru=104 $RuO^4_\wedge, RuCl^4$ $RuO^2, RuCl^3$ RuK^4Cy^6	Rh=104 $RhCl^3, RhCl^2$ $Rh^2O^3_*, RhX^3$ RhK^3Cy^6	Pd=106 PdH_*, PdO_* PdI^2_*, PCl^2 PdK^2Cy^4	Ag=108 $AgNO^3, AgX$ $AgCl_*, Ag^2O_*$ $AgKCy^2$
Періодъ 3-й.	Рядъ 5.	Ag=108 $AgX, AgCl_*$	Cd=112 $CdCl^2, CdO_*, CdS_*$ $CdSO^4$	In=113 $InCl^3, In^2O^3_*$	Sn=118 $SnCl^2_\wedge, SnCl^4_\wedge, SnO_*$ $SnX^4, SnNa^2O^3$	Sb=122 $SbH^3_\wedge, SbCl^3_\wedge, Sb^2O^3_*$ $Sb^2O^5_*, Sb^2S^3_*, SbOX$	Te=125(?128?) $TeH^2_\wedge, TeCl^4, TeO^2$ TeO^4M^2, TeM^2_*	I=127 $IH_\wedge, IAg_*, IHO^3$ IHO^4, HgI^2_*, KI				
	Рядъ 6.	Cs=133 $CsCl, CsOH.$ $Cs^2PtCl^6_*$	Ba=137 $BaCl^2, BaH^2O^2, BaO$ $BaSO^4_*, BaSiF^6_*$	—— ?138=La?=Di?(144) ?$La^2O^3_*, LaX^3$?	Ce=140(138?) $CeCl^3, Ce^2O^3_*, CeO^2_*$ CeX^3, CeX^4, CeK^2X^6	—— 142	—— 146	—— 148	—— 150	—— 151	—— 152	—— 153
Періодъ 4-й.	Рядъ 7.	—— 153	—— 158	—— 160	—— 162	—— 164	—— 166	—— 168				
	Рядъ 8.	—— 175	—— 177	—— ?178=Er?(169) ?$Er^2O^3_*, ErX^3$?	—— ?180=Di?=La(187) ?DiO^2_*, DiX^4?	Ta=182 $TaCl^5_\wedge, Ta^2O^5_*$ $TaK^2F^7_*$	W=184 $WCl^6_\wedge, WCl^4, WO^3_*$ $K^2WO^4 nWO^3_*$	—— 190	199? Os=193 $OsO^4_\wedge, OsH^2O^4$ $OsCl^4, OsCl^3$ OsK^4Cy^6	198? Ir=195 $K^2IrCl^6, IrCl^4$ $IrCl^3_*, Ir^2O^3_*$ IrK^3Cy^6	Pt=197 $PtCl^4, PtO^2_*$ $PtCl^2, PtK^2X^4$ PtK^2Cy^4	Au=197 $AuCl^3, AuCl$ $Au^2O^3_*, Au^2O_*$ $AuKCy^2$
Періодъ 5-й.	Рядъ 9.	Au=197 AuX, AuX^3	Hg=200 $HgCl_\wedge, HgCl^2_\wedge, Hg^2O_*$ $HgO_*, HgX^2 nHgO$	Tl=204 $TlCl_*, Tl^2O, Tl^2O^3_*$ $Tl^2SO^4, TlCl^3$	Pb=207 $PbCl^2_*, PbO_*, PbO^2_*$ $PbEt^4_\wedge, PbSO^4_*, PbK^2O^3$	Bi=208 $BiCl^3, Bi^2O^3_*, Bi^2O^7H^4_*$ $BiX^3, BiOX, BiNO^3(HO)^2_*$	—— 210	—— 212				
	Рядъ 10.	—— 220	—— 225	—— 227	Th=231 $ThCl^4, ThO^2_*$ $ThX^4, Th(SO^4)^2$	—— 235	U=240 $UCl^4_\wedge, UO^3_*, UO^2X^2$ $UO^3_*, M^2U^2O^7_*$	—— 245	—— 246	—— 248	—— 249	—— 250

* Тѣло твердое, малорастворимое въ водѣ.
∧ Тѣло газообразное или летучее.
M=K, Ag..... M^2=Ca, Pb .....
X=Cl, ONO^2, OH, OM..... X^2=SO^4, CO^3, O, S.....

london underground (harry beck, 1933)



experiential

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modular

components of the structure can be understood independently

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modular

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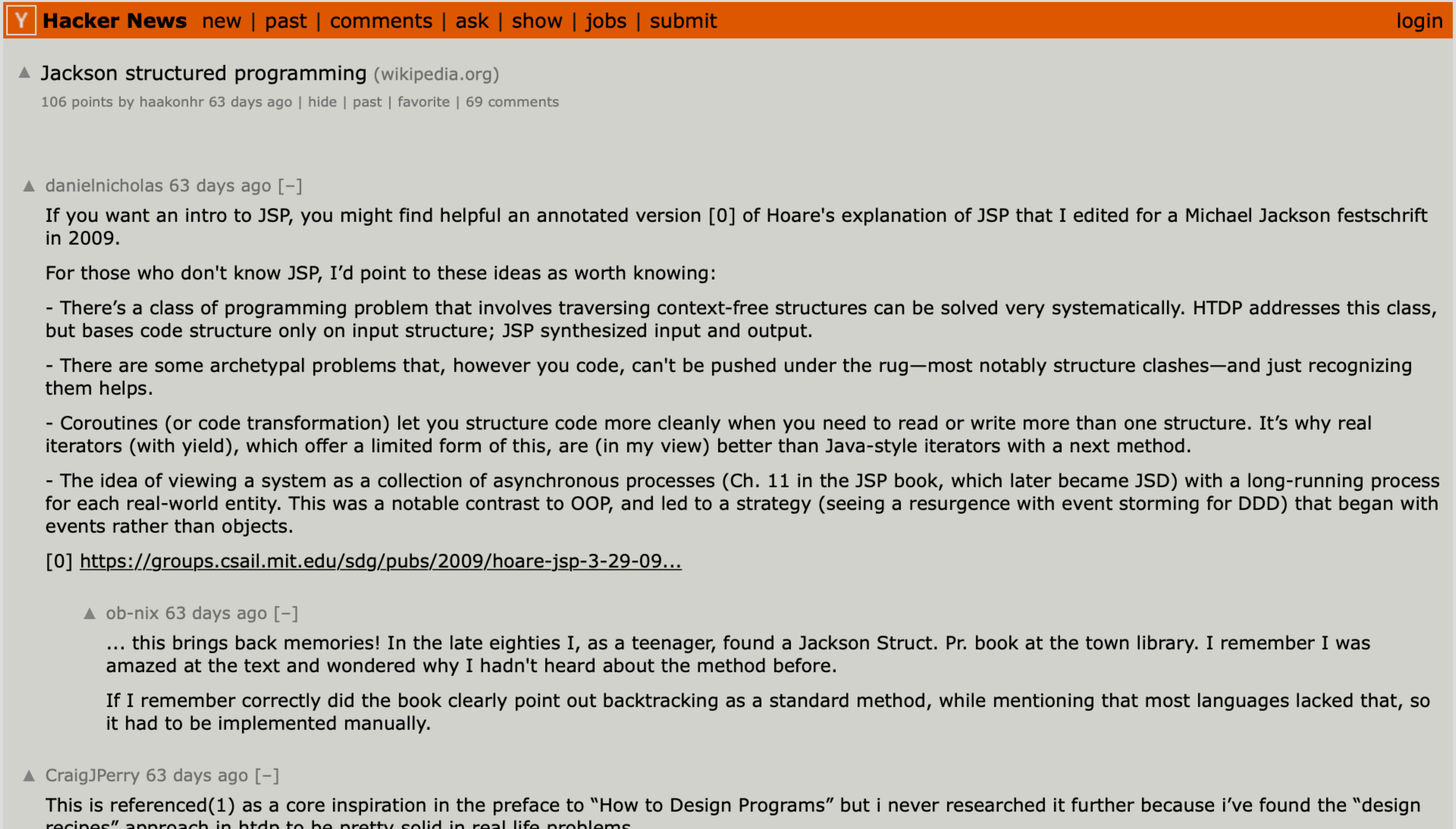
abstract

internal workings and structure are not shown what are the elements of software?



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106 points by haakonhr 63 days ago | hide | past | favorite | 69 comments

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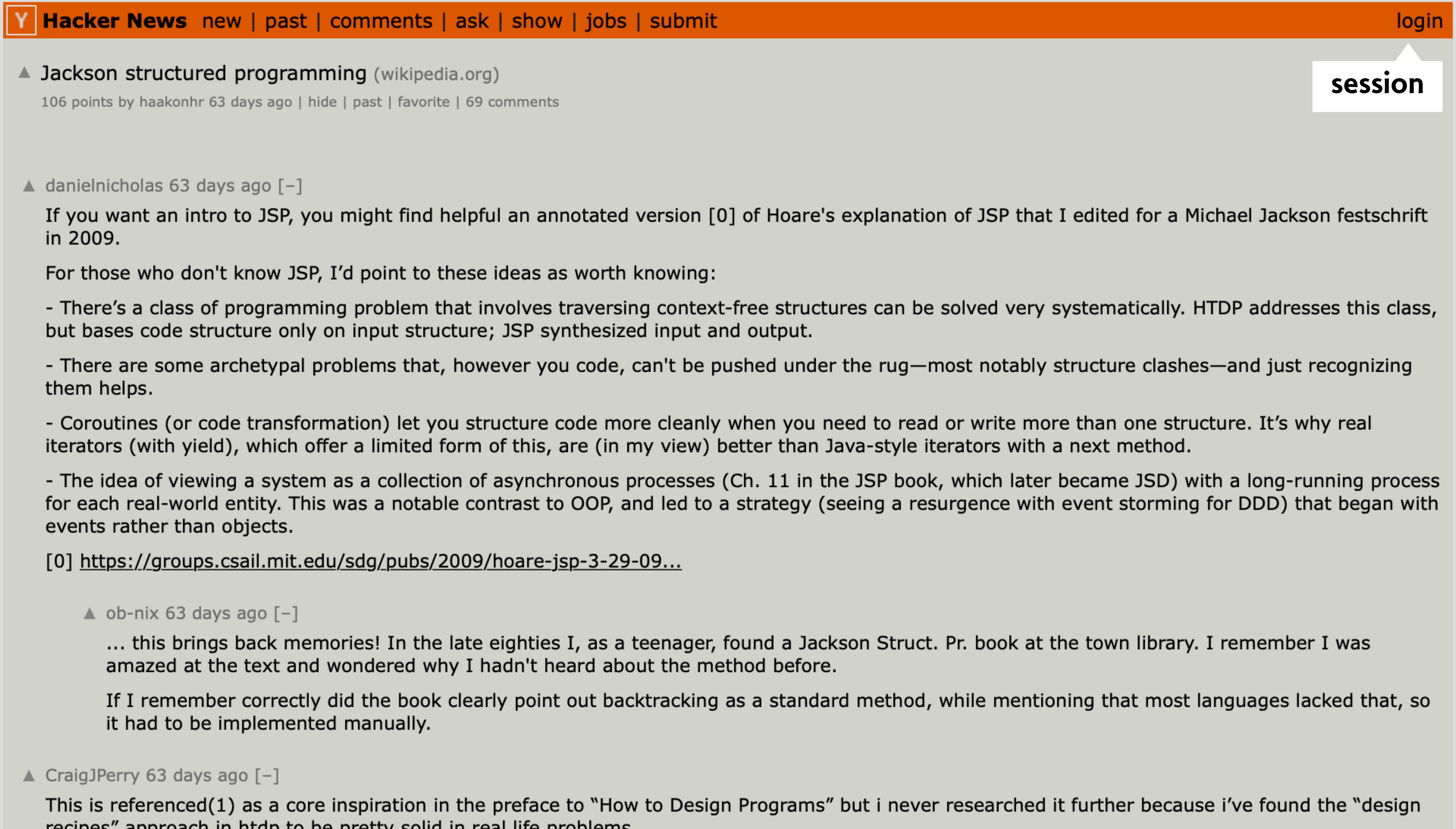

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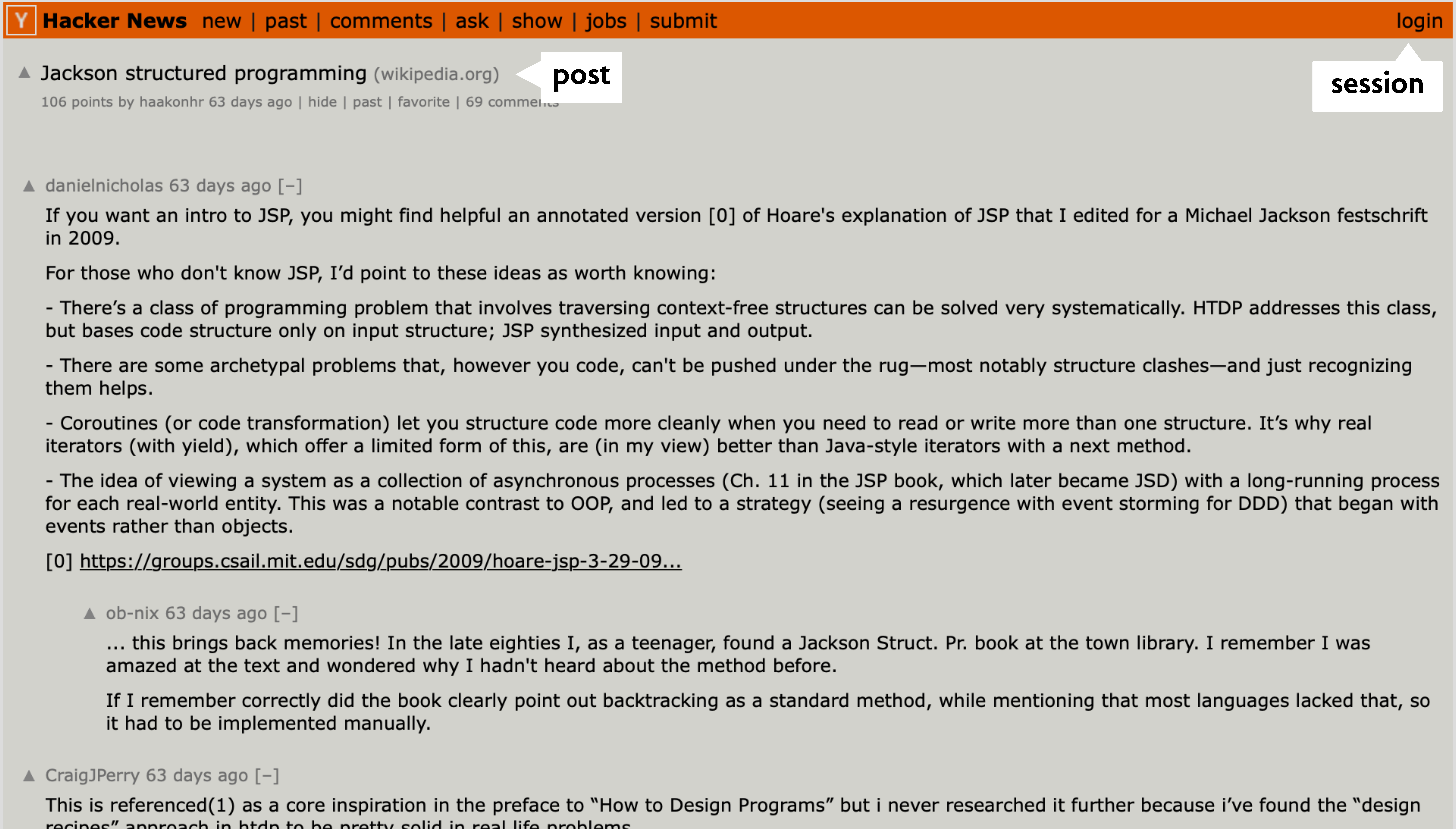

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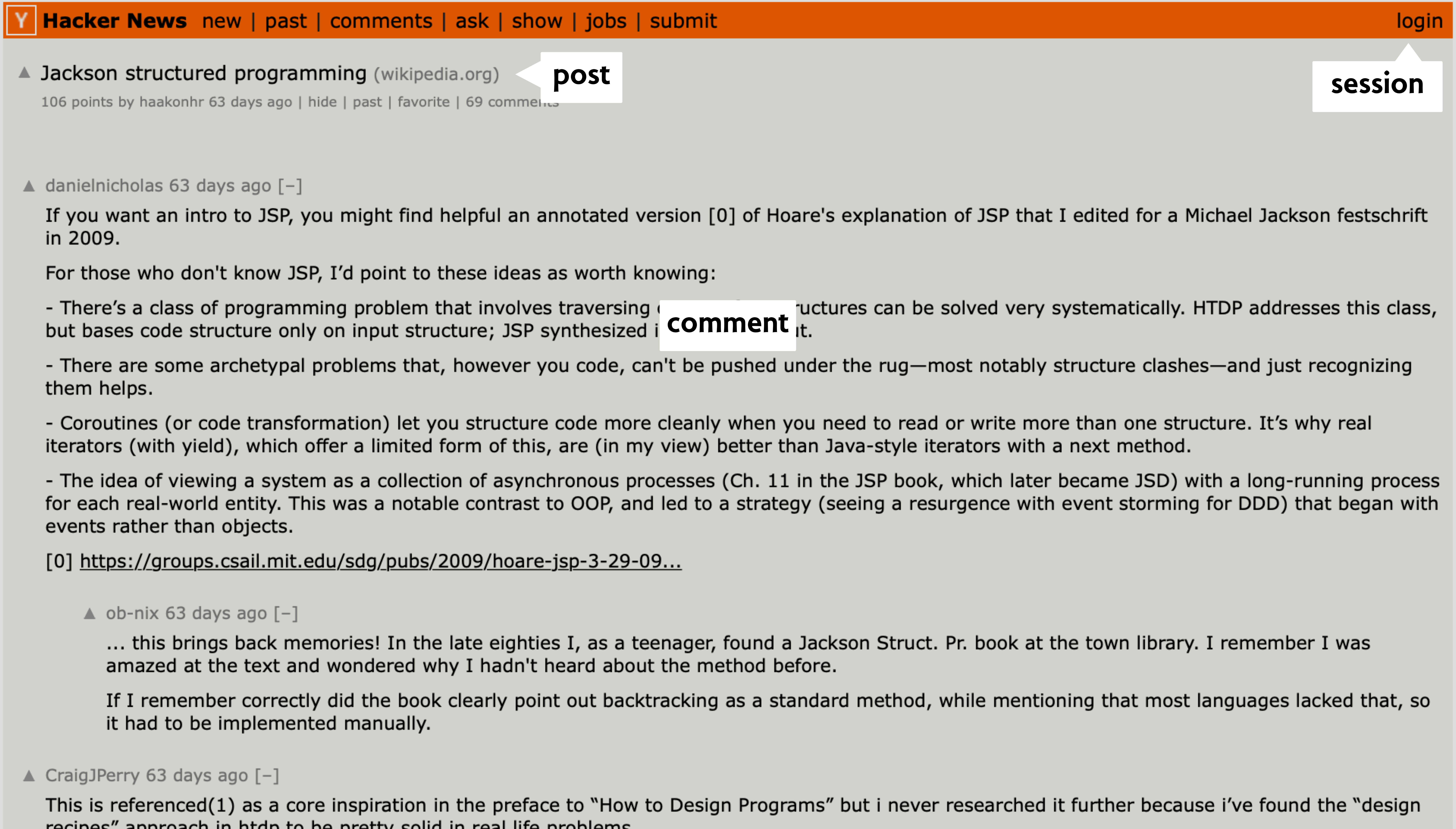

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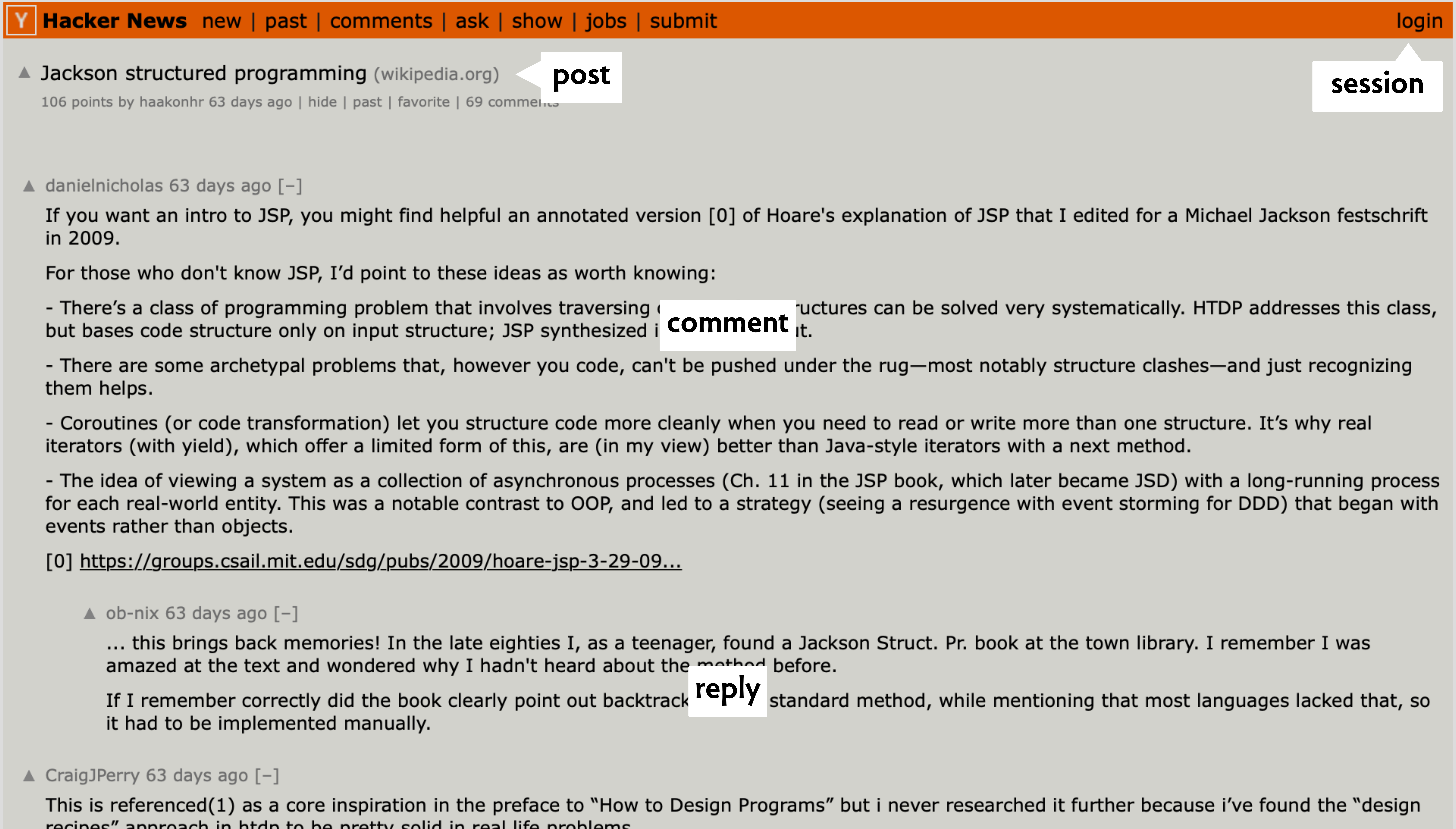

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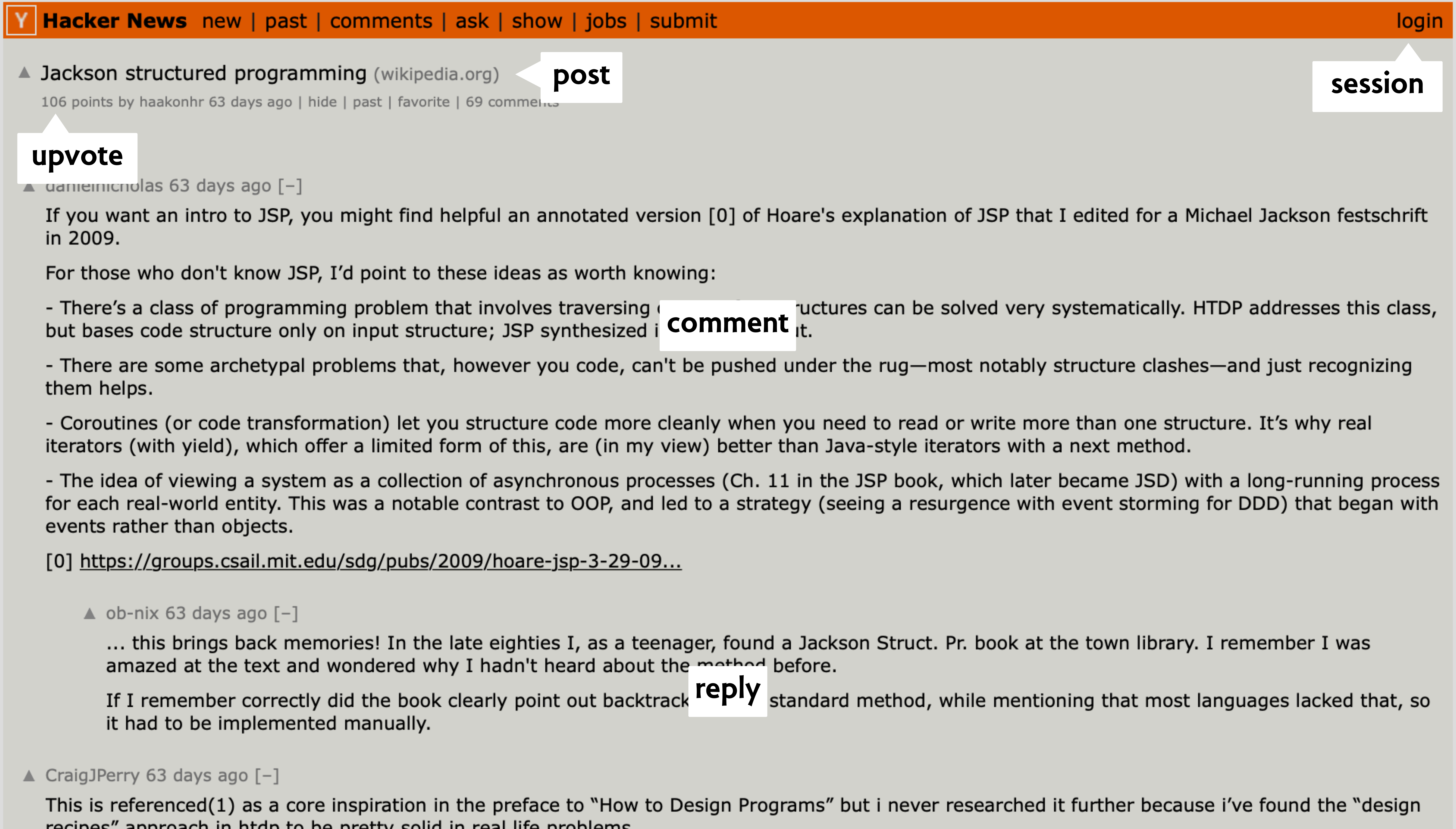

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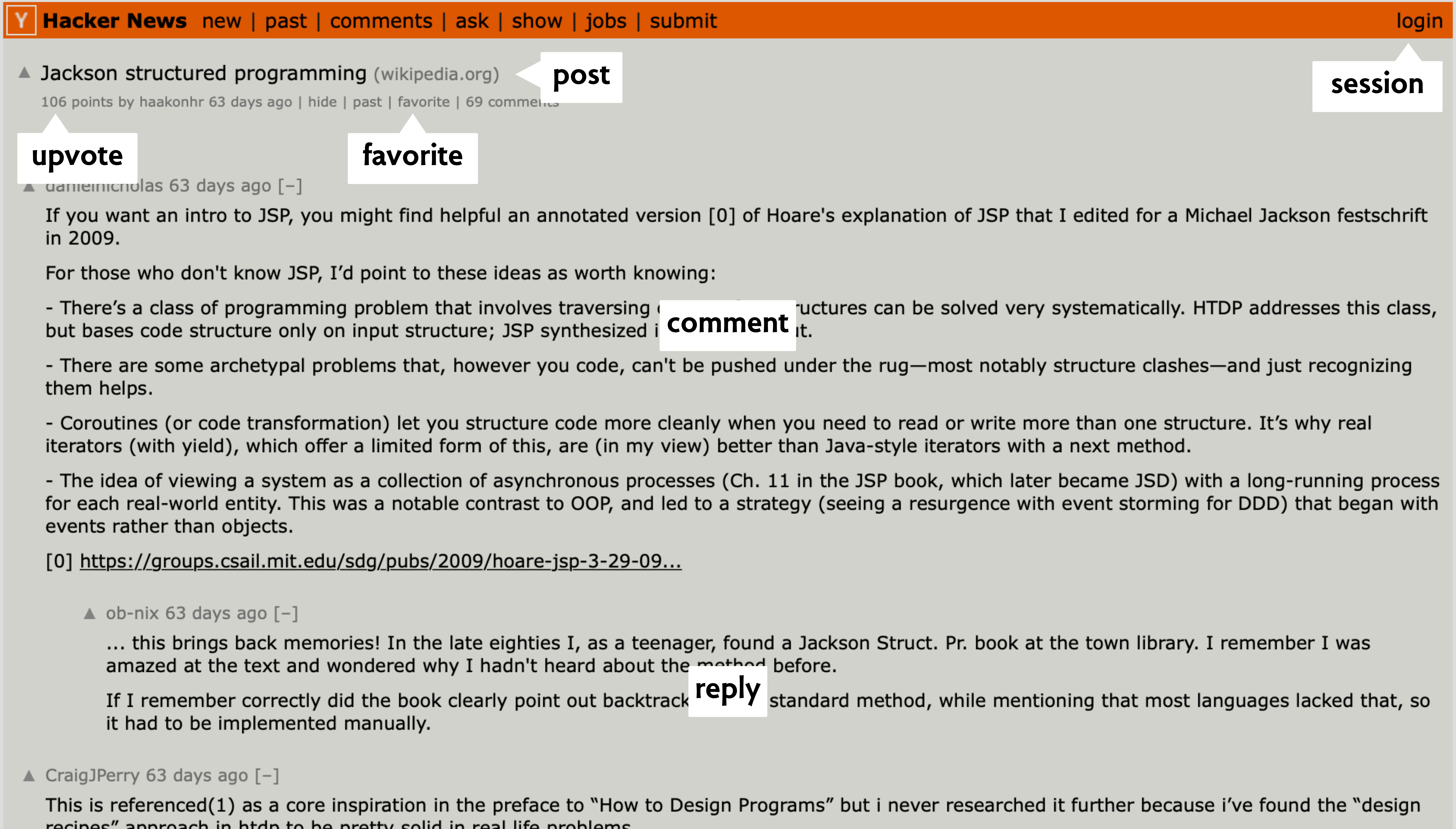

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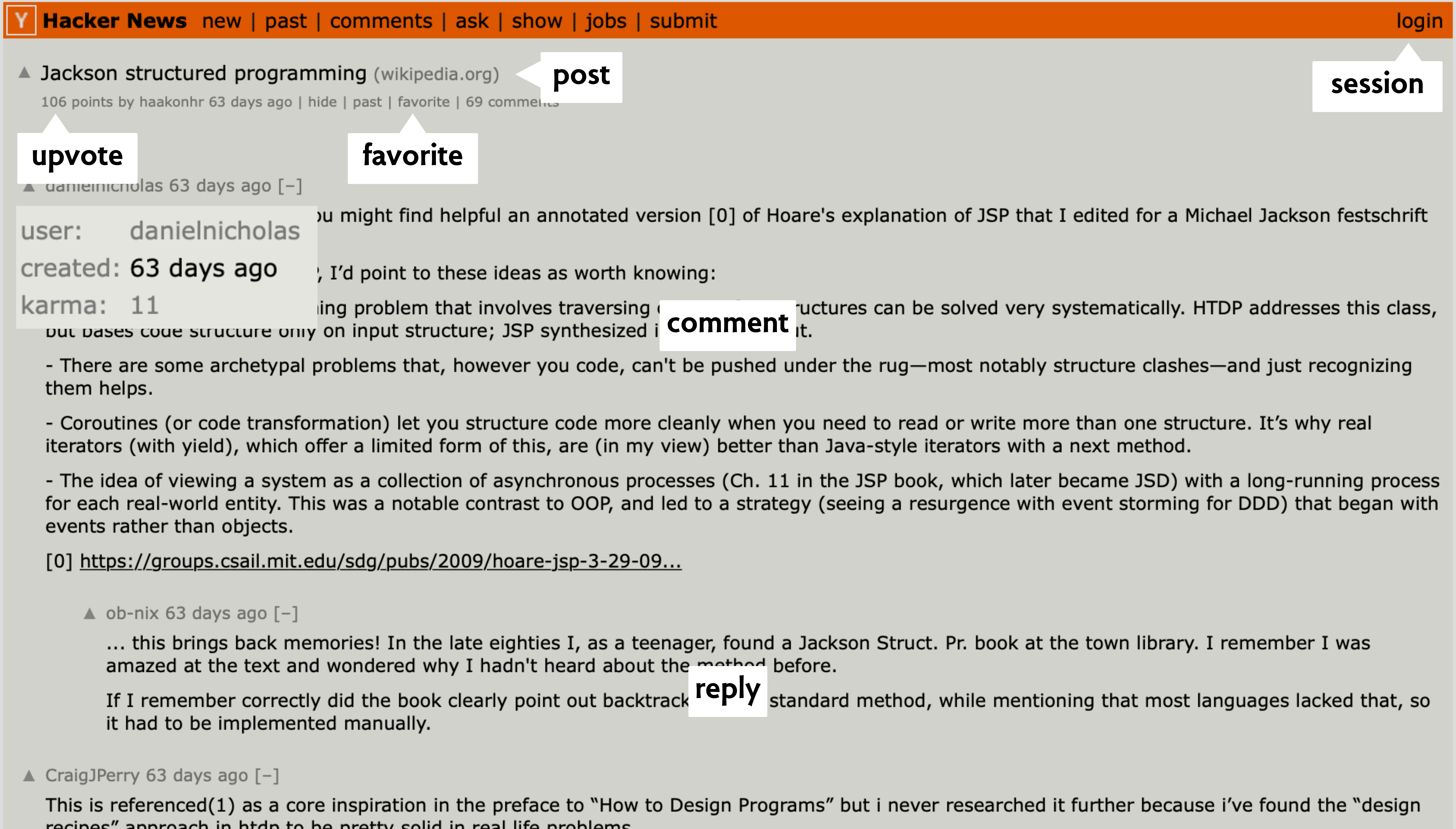

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reply

▲ Jackson structured programming (wikipedia.org)

106 points by haakonhr 63 days ago | hide | past | favorite | 69 comme

▲ danielnicholas 63 days ago [–]

user: danielnicholas
created: 63 days ago
karma: 11

u might find helpful an annotated version [0] of Hoare's explanation of JSP that I edited for a Michael Jackson festschrift

, I'd point to these ideas as worth knowing:

ing problem that involves traversing ructures can be solved very systematically. HTDP addresses this class, on input structure; JSP synthesized i it.

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- The idea of viewing a system as a collection of asynchronous processes (Ch. 11 in the JSP book, which later became JSD) with a long-running process for each real-world entity. This was a notable contrast to OOP, and led to a strategy (seeing a resurgence with event storming for DDD) that began with events rather than objects.

[0] https://groups.csail.mit.edu/sdg/pubs/2009/hoare-jsp-3-29-09...

▲ ob-nix 63 days ago [–]

... this brings back memories! In the late eighties I, as a teenager, found a Jackson Struct. Pr. book at the town library. I remember I was amazed at the text and wondered why I hadn't heard about the before.

If I remember correctly did the book clearly point out backtrack standard method, while mentioning that most languages lacked that, so it had to be implemented manually.

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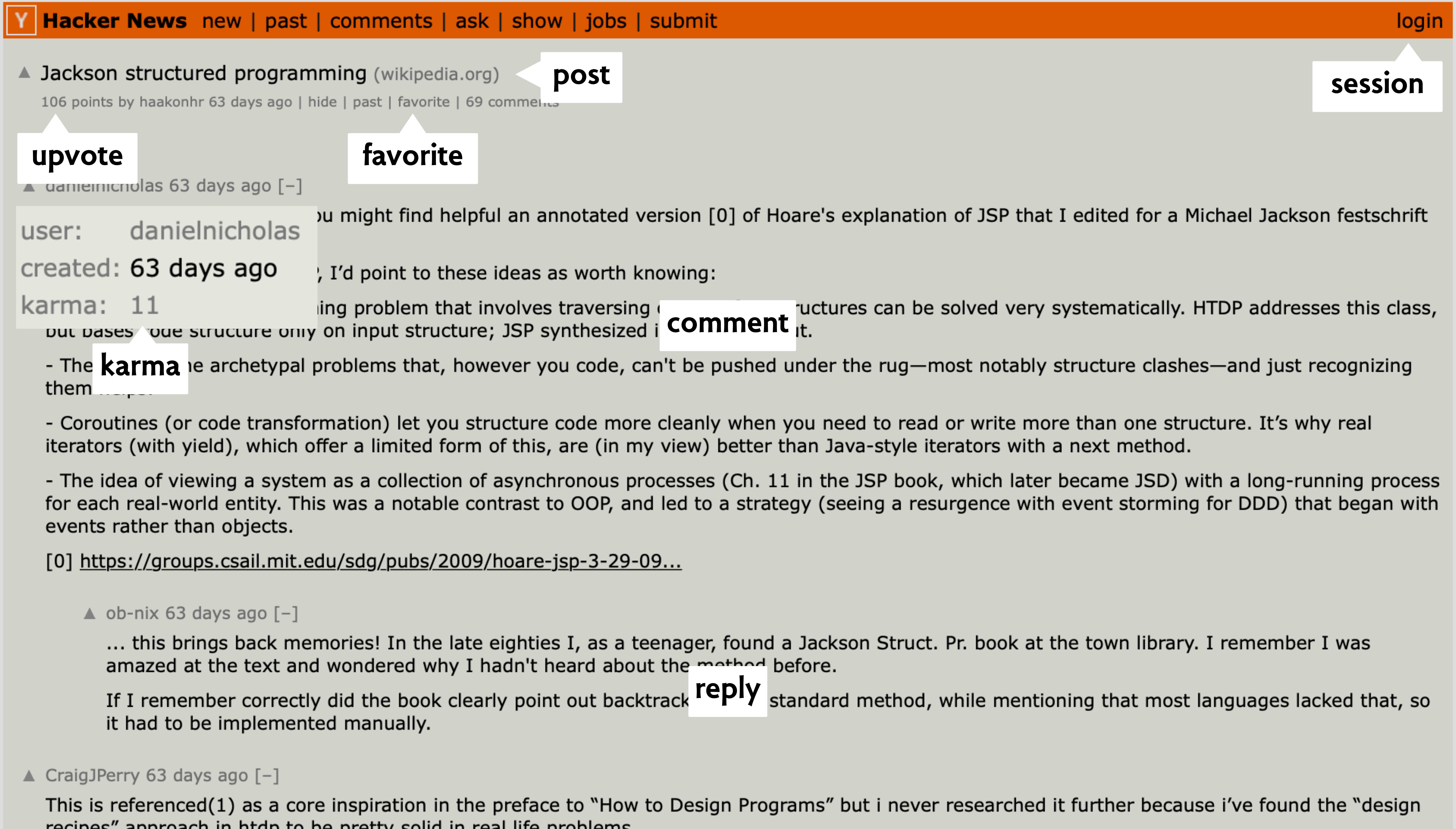

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but what’s a concept? three things it isn’t

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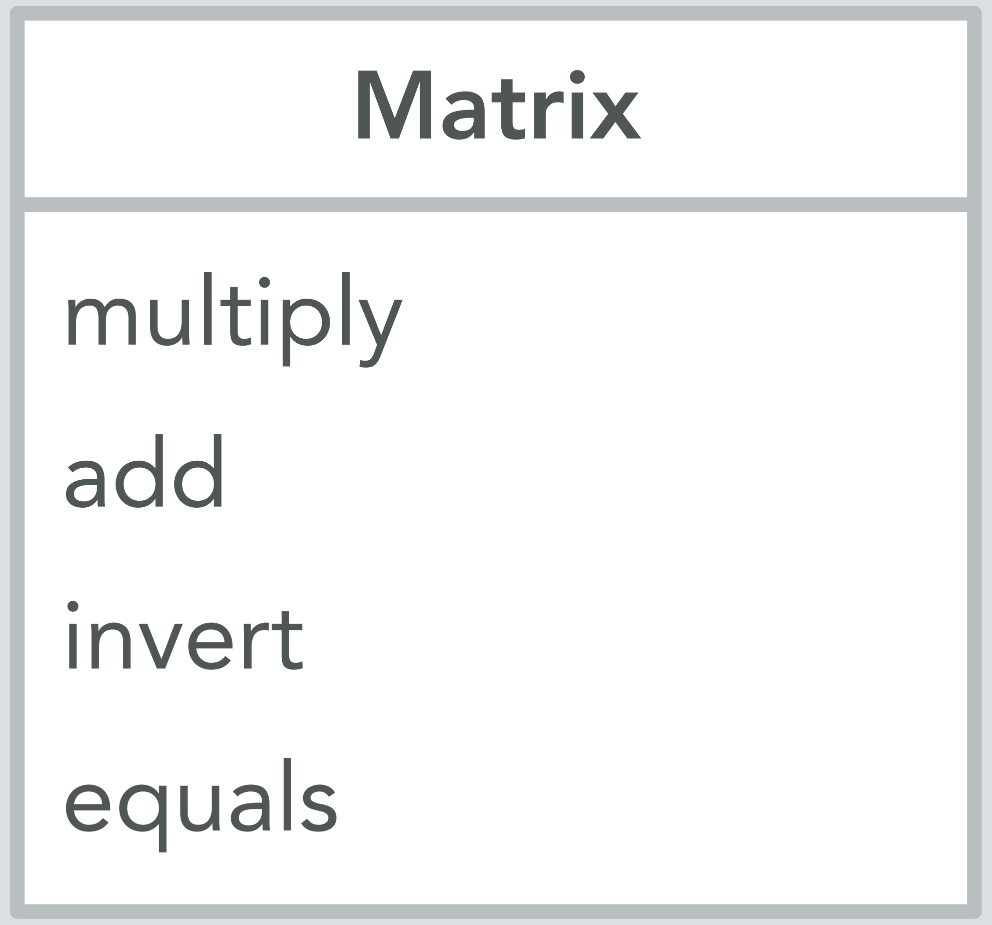
abstract type, class/object



Matrix

multiply
add
invert
equals

not limited to built-in types
encapsulate representation
defined by operations alone

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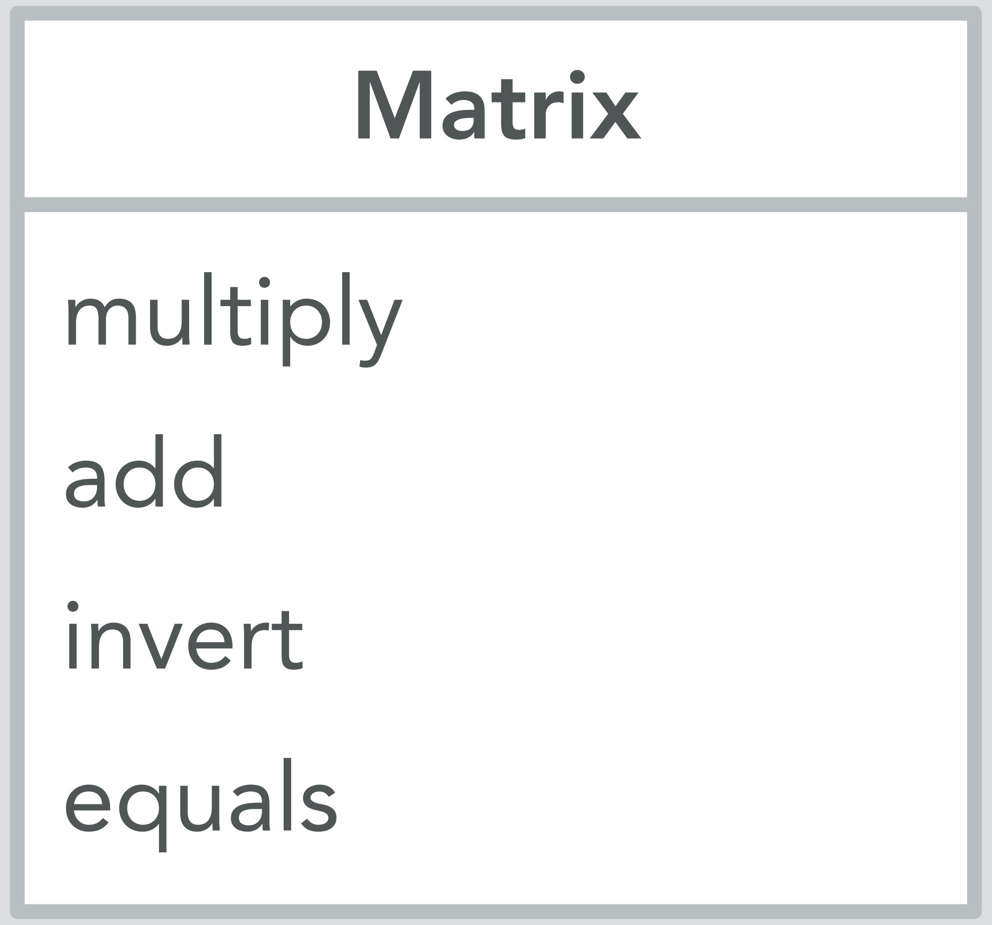

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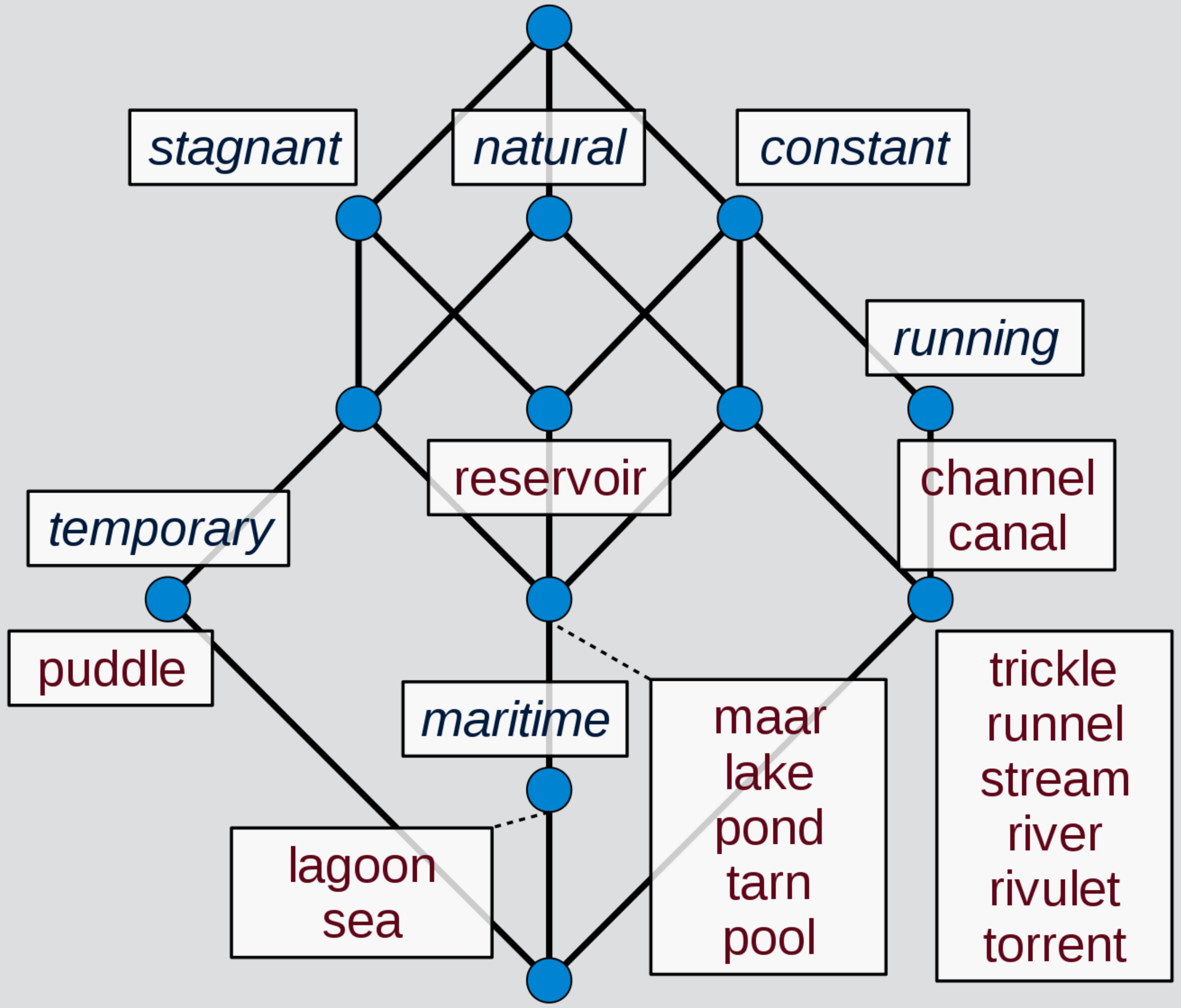

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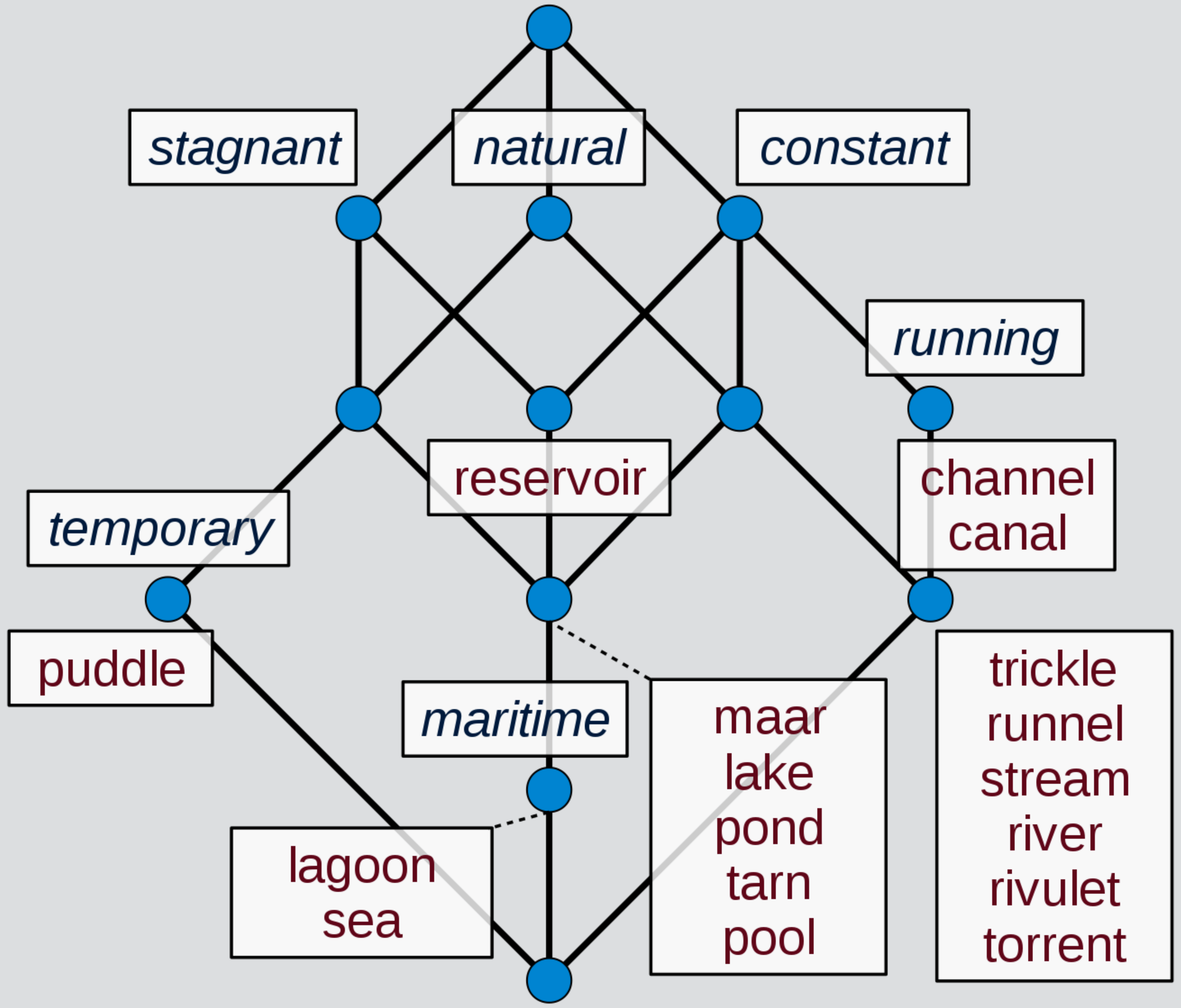

upvotes and downvotes
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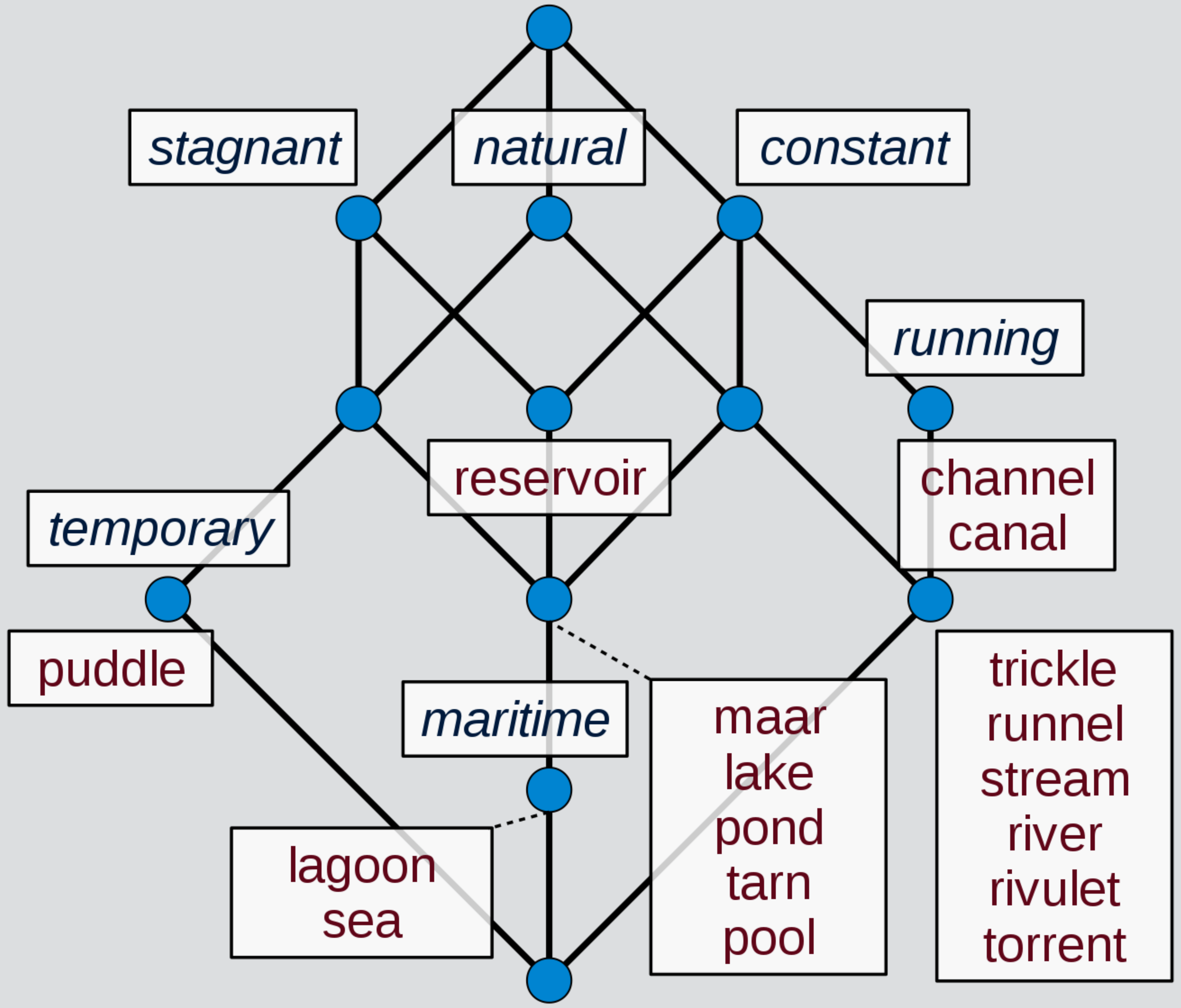

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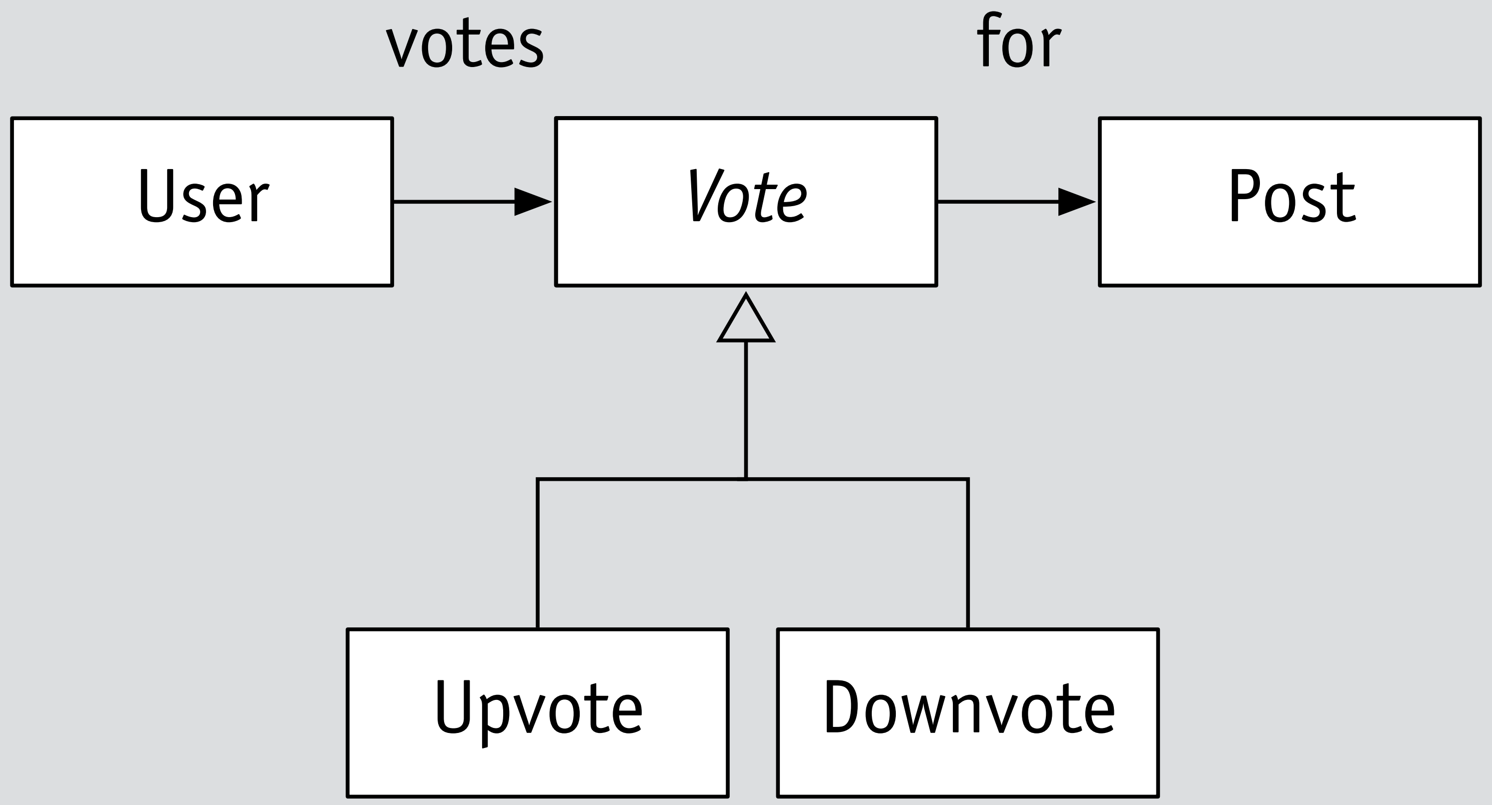
entity in data model



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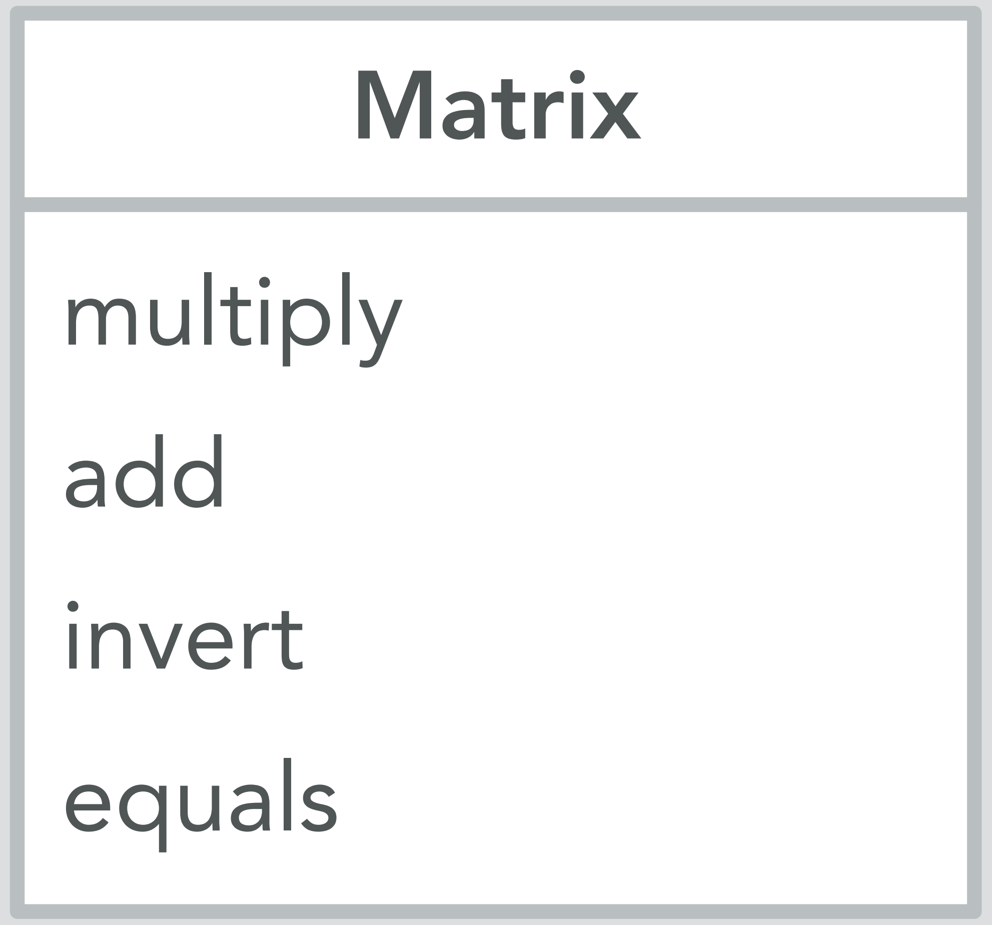

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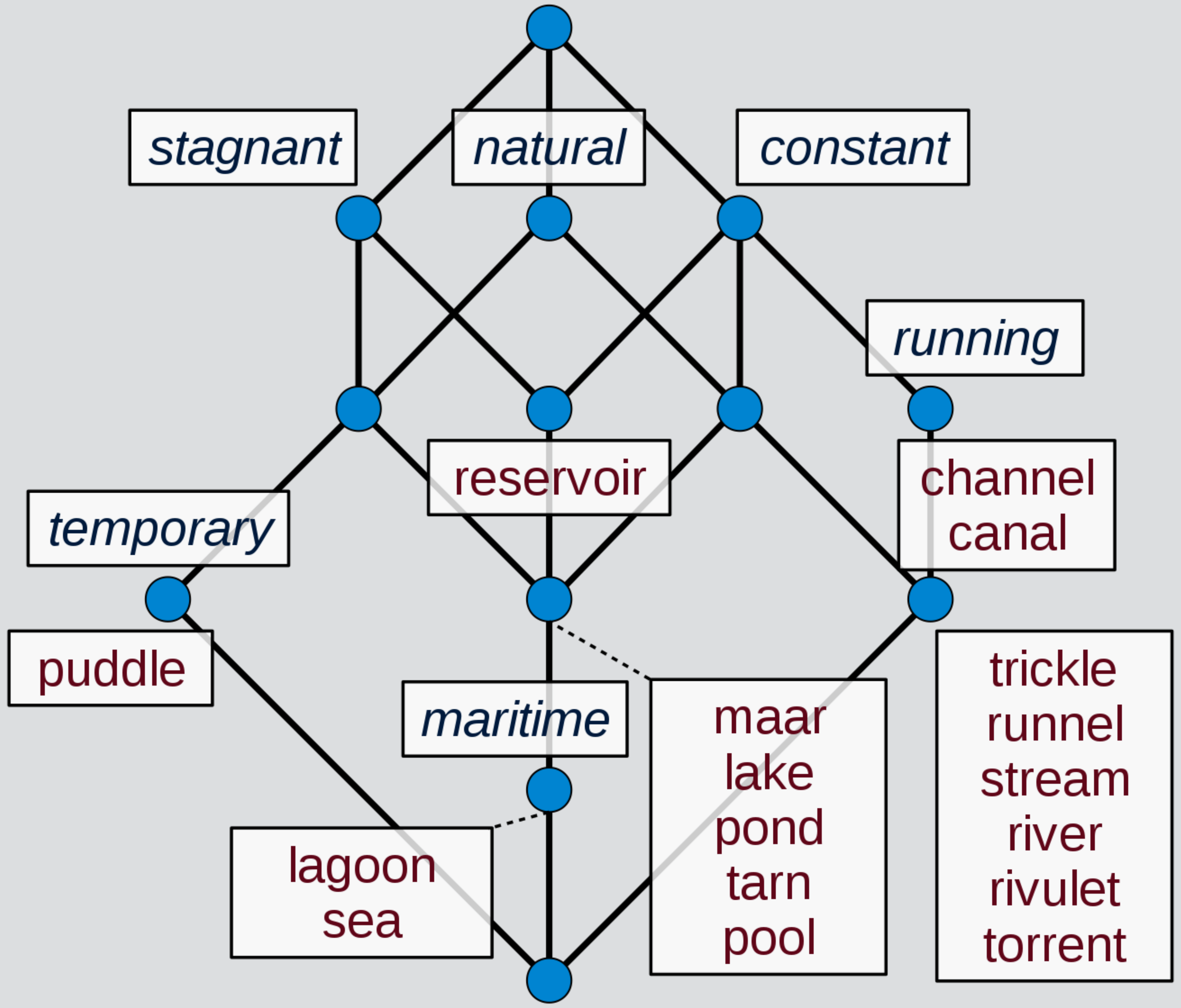

stagnant

natural

constant

running

temporary

reservoir

channel
canal

puddle

maritime

maar
lake
pond
tarn
pool

trickle
runnel
stream
river
rivulet
torrent

lagoon
sea

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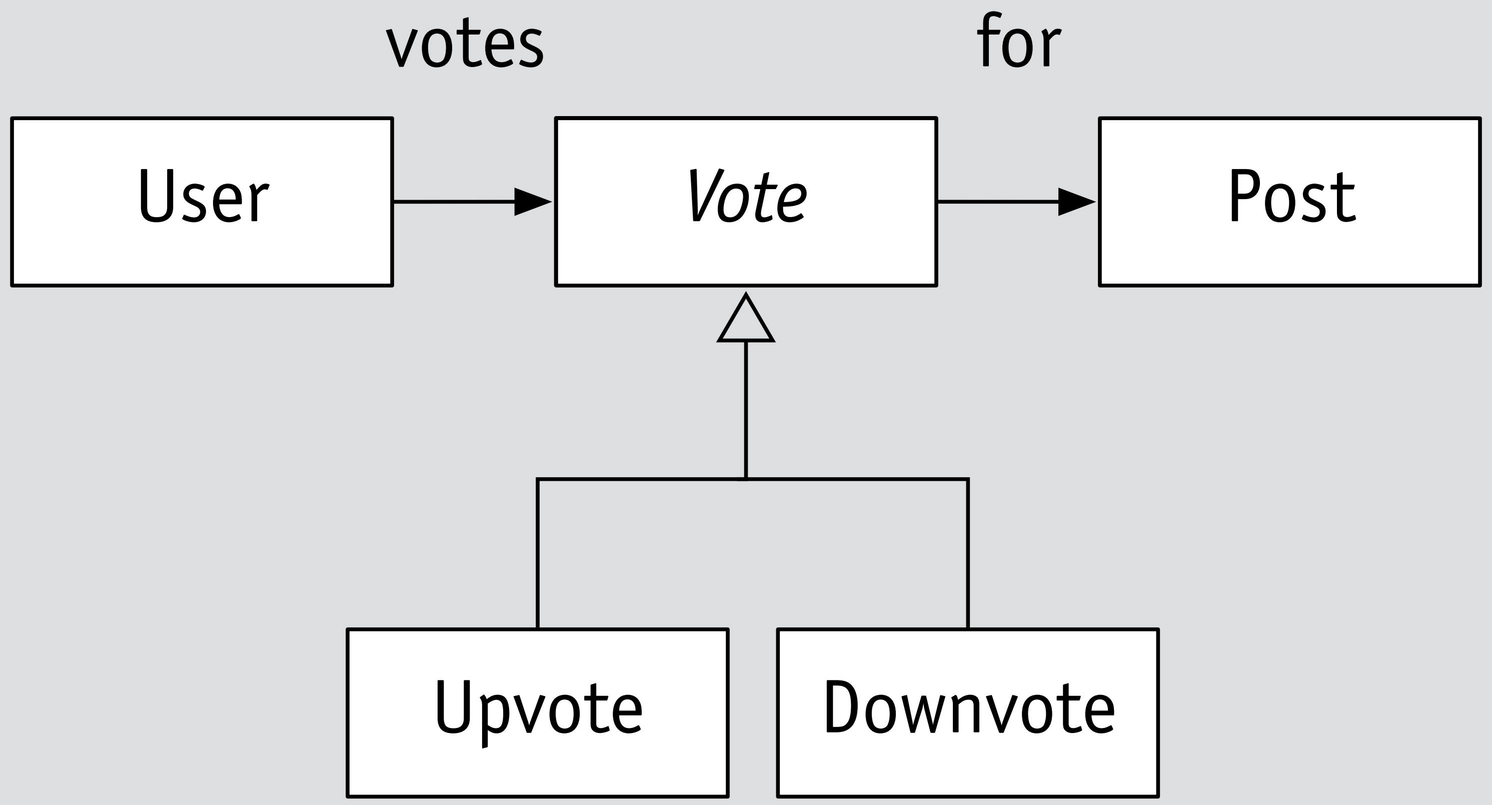

votes

for

User

Vote

Post

Upvote

Downvote

but concept is in the
relationships, not the entities!

a concept has a **name**

```
concept Upvote
```

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concept Upvote

same concept in HackerNews, NYTimes comment section, StackOverflow, etc

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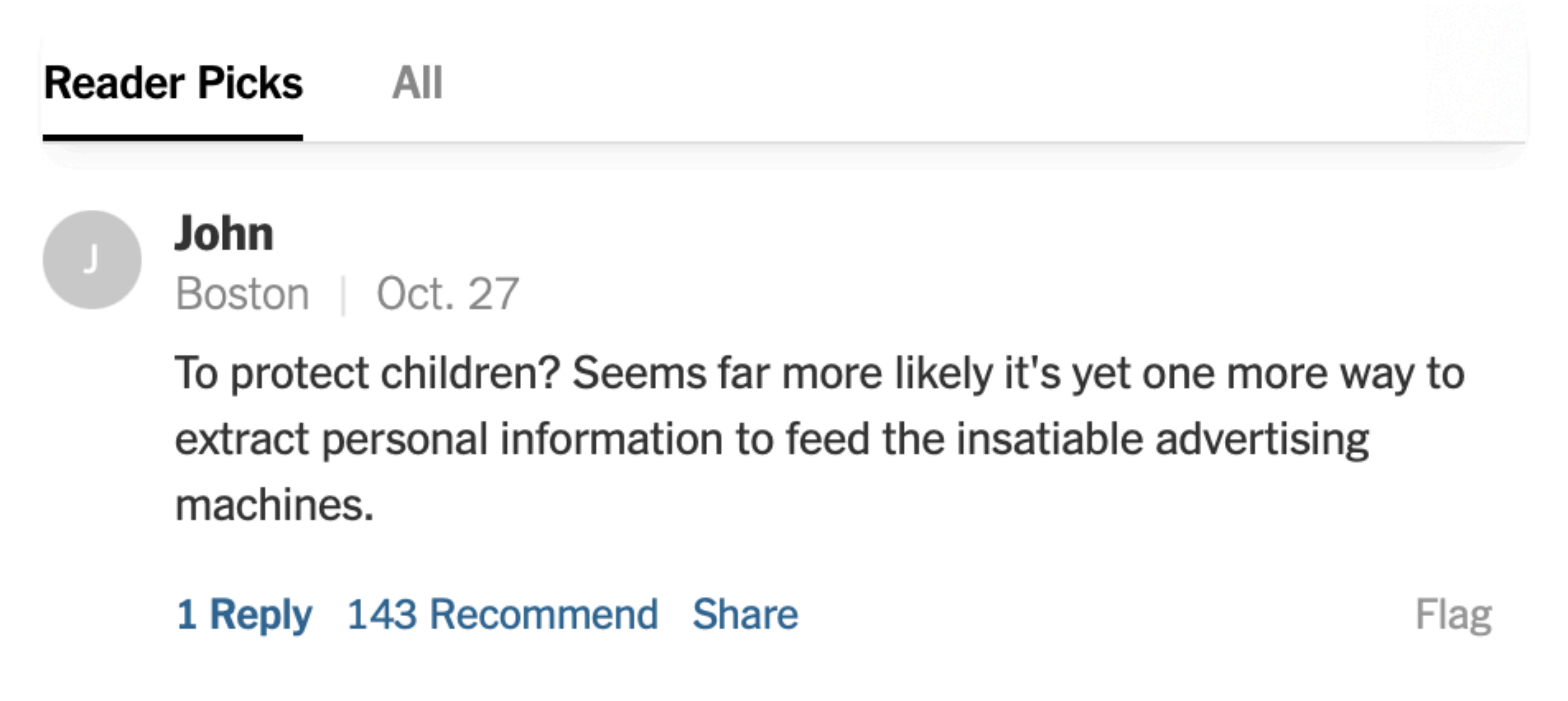


Reader Picks All

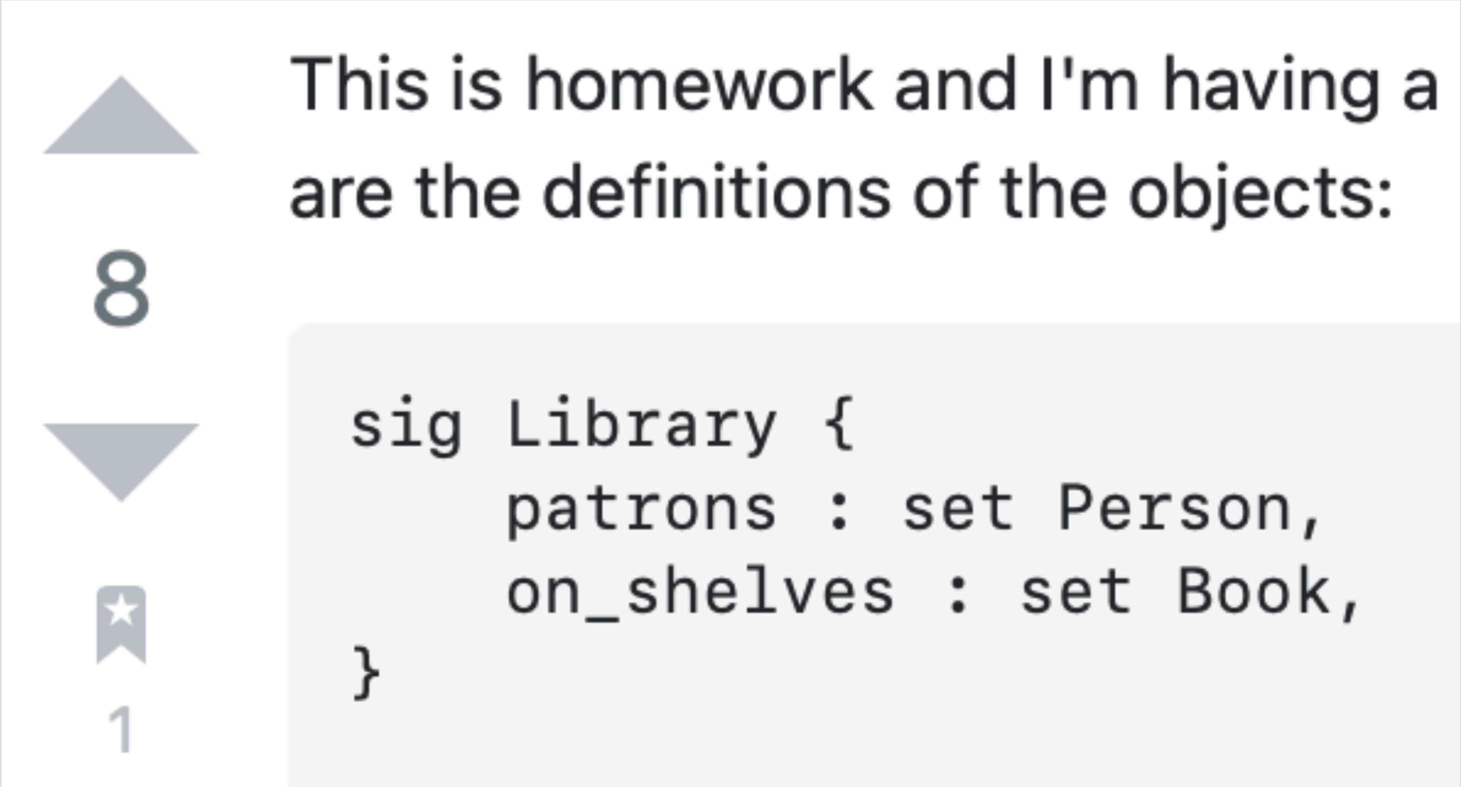
John
Boston | Oct. 27

To protect children? Seems far more likely it's yet one more way to extract personal information to feed the insatiable advertising machines.

a concept has a **purpose**

concept Upvote

purpose rank items by popularity



This is homework and I'm having a
are the definitions of the objects:

```
sig Library {
    patrons : set Person,
    on_shelves : set Book,
}
```

a concept has a purpose

concept Upvote

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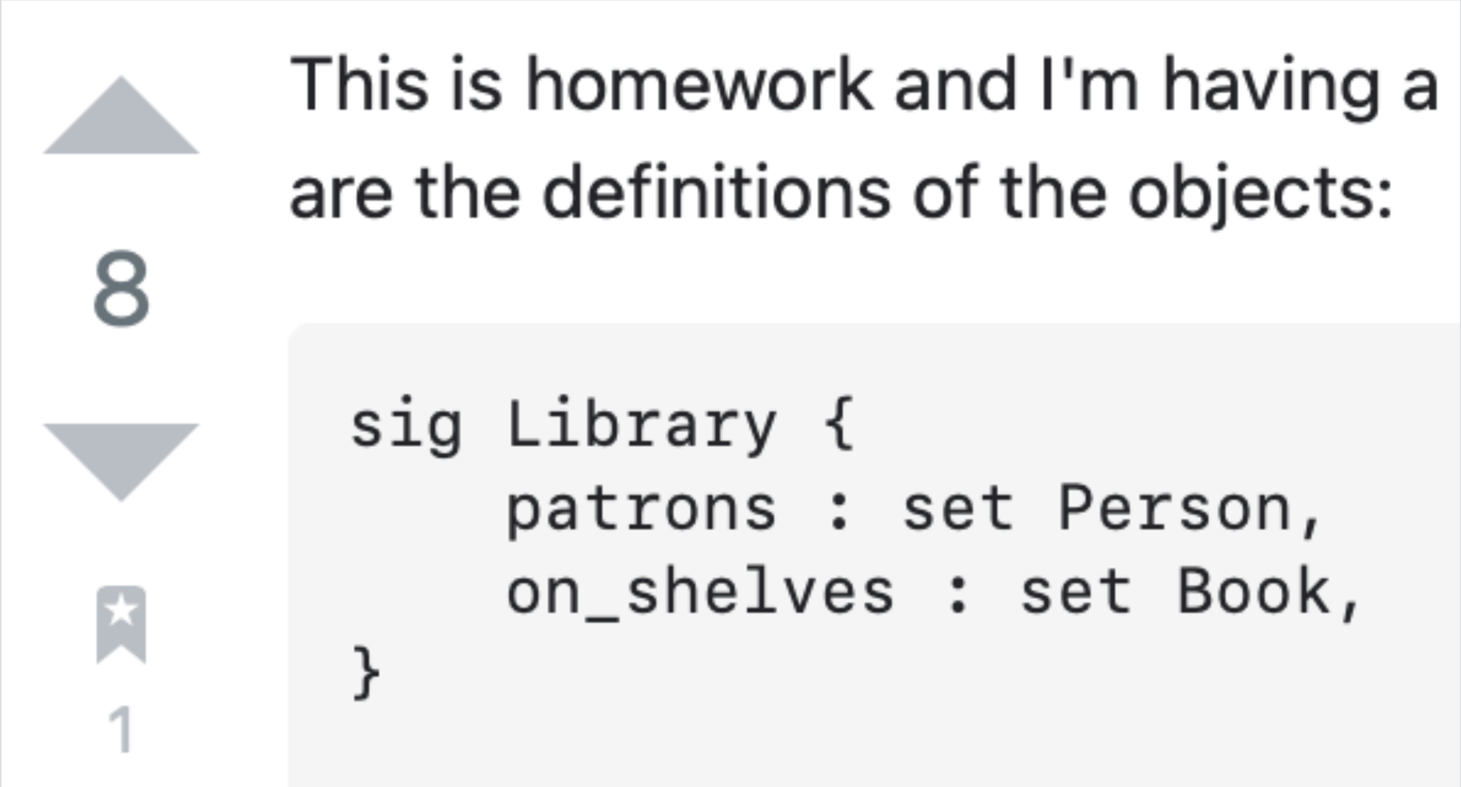
concept Reaction

purpose send reactions to author



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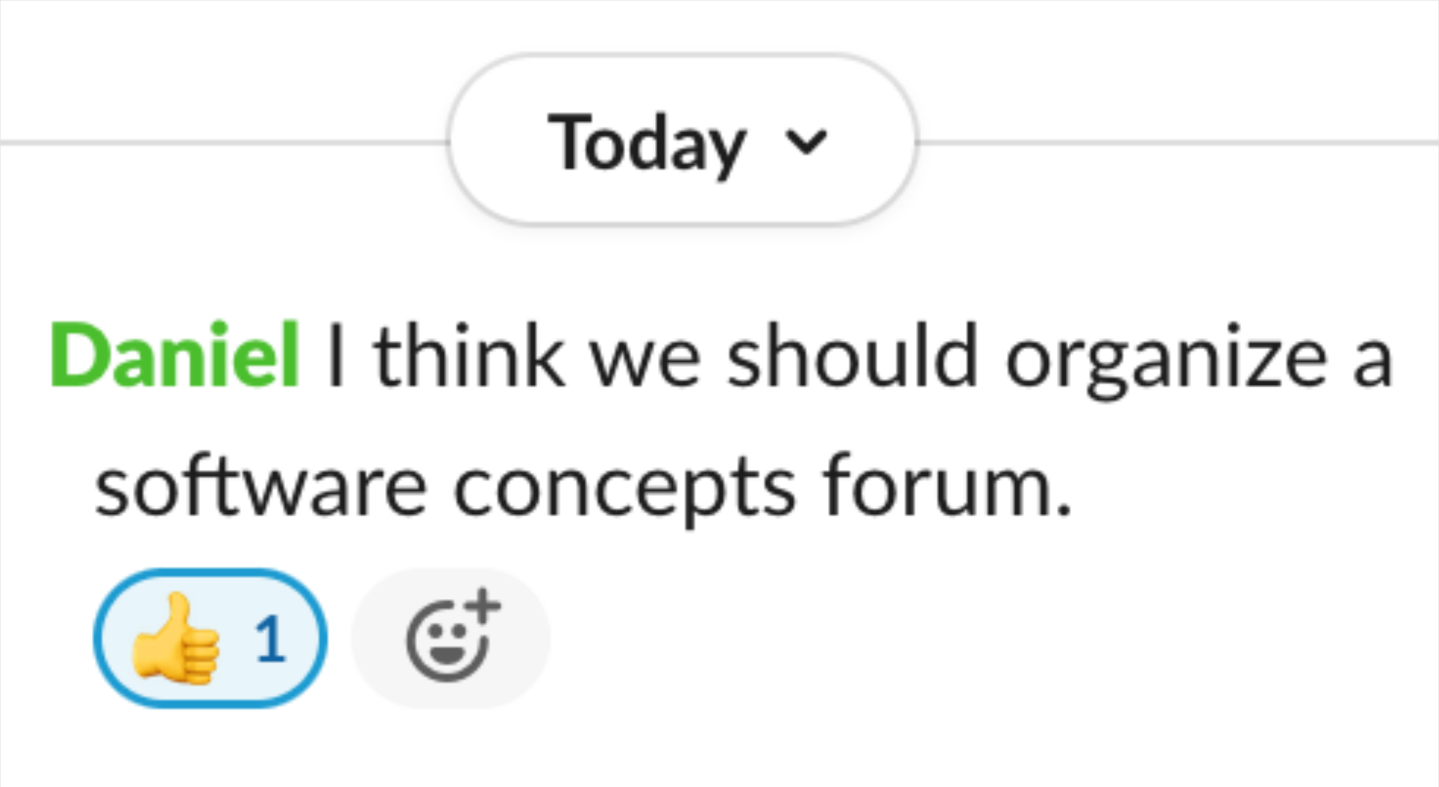

Daniel I think we should organize a software concepts forum.

a concept has a purpose

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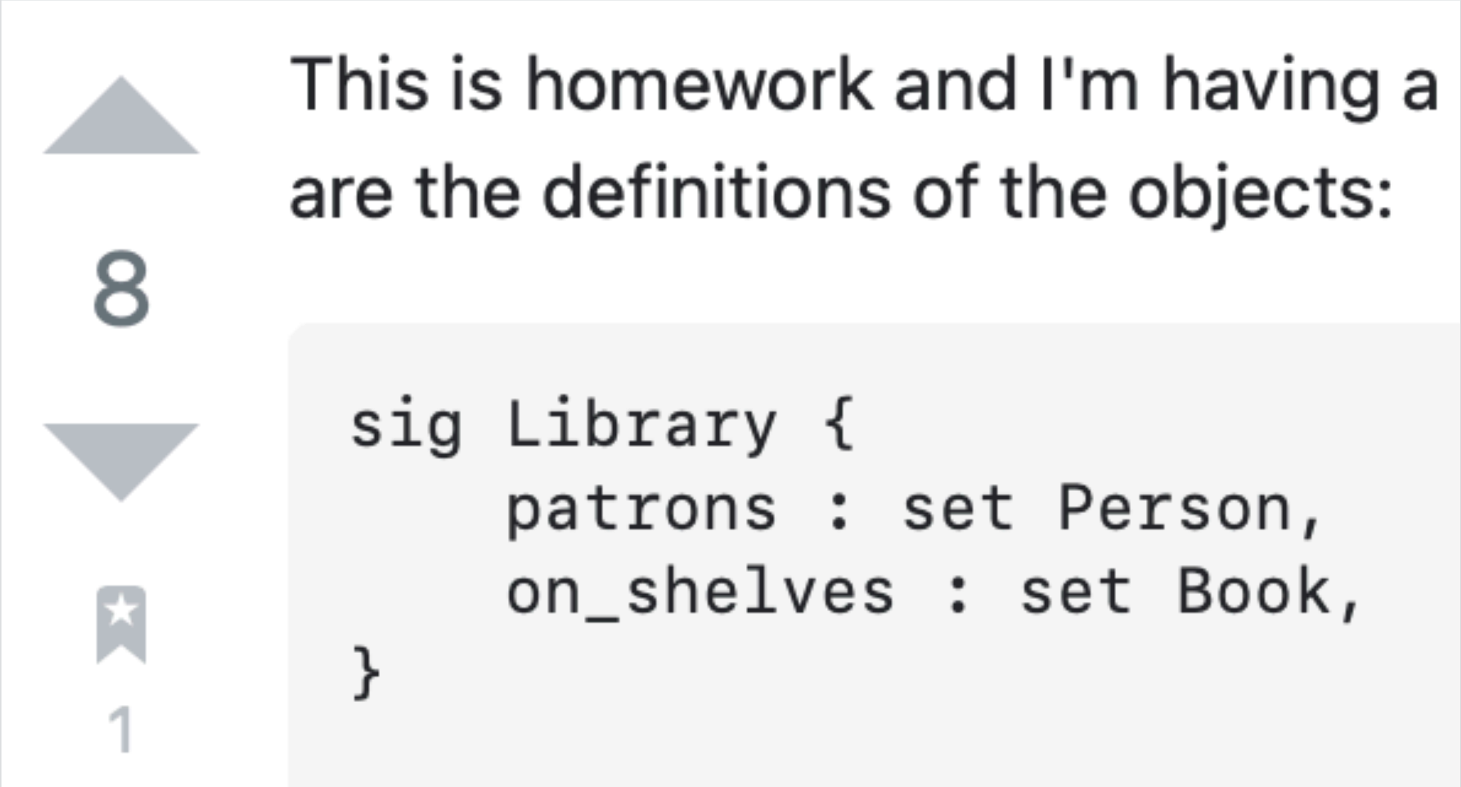

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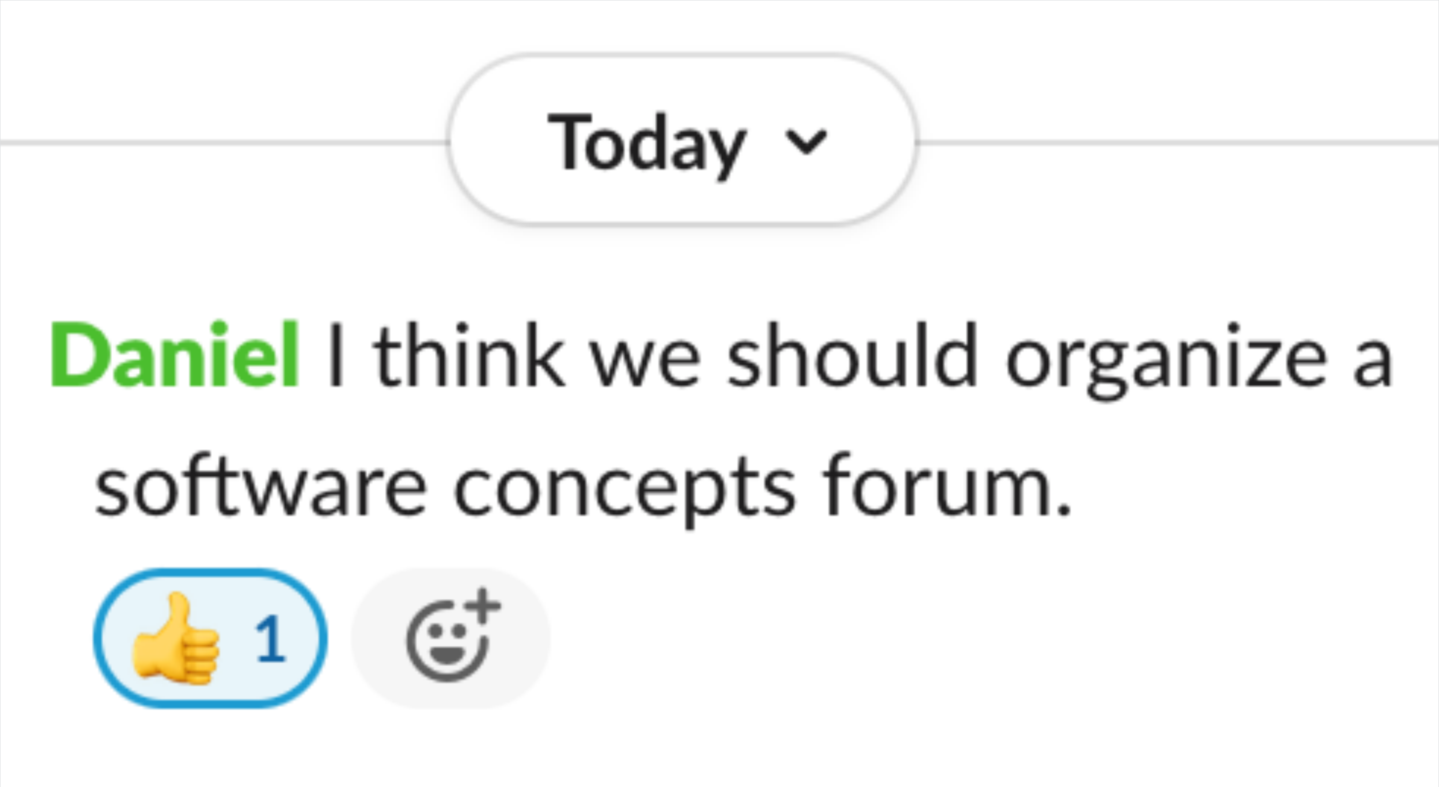
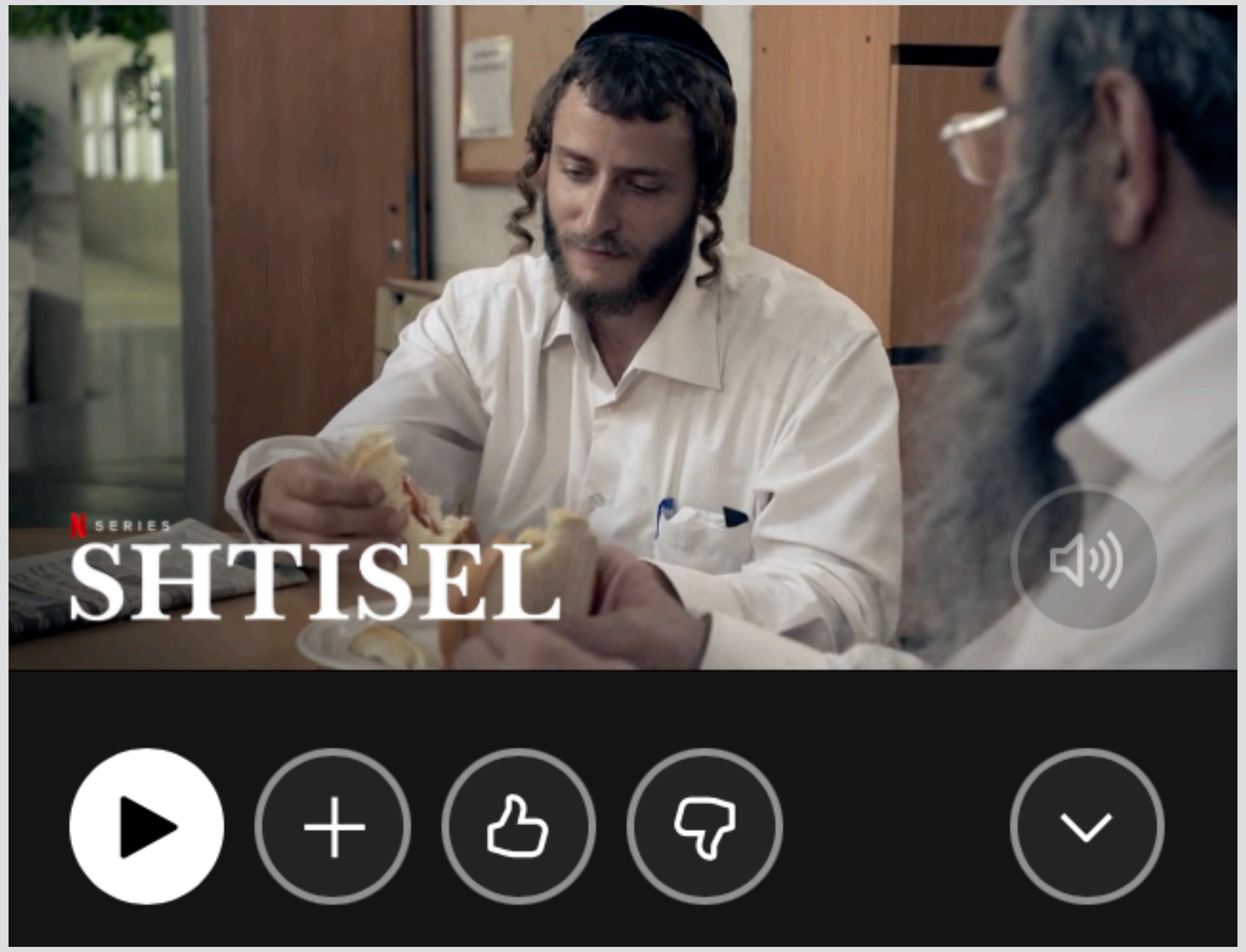


Daniel I think we should organize a software concepts forum.

concept Recommendation

purpose use prior likes to recommend



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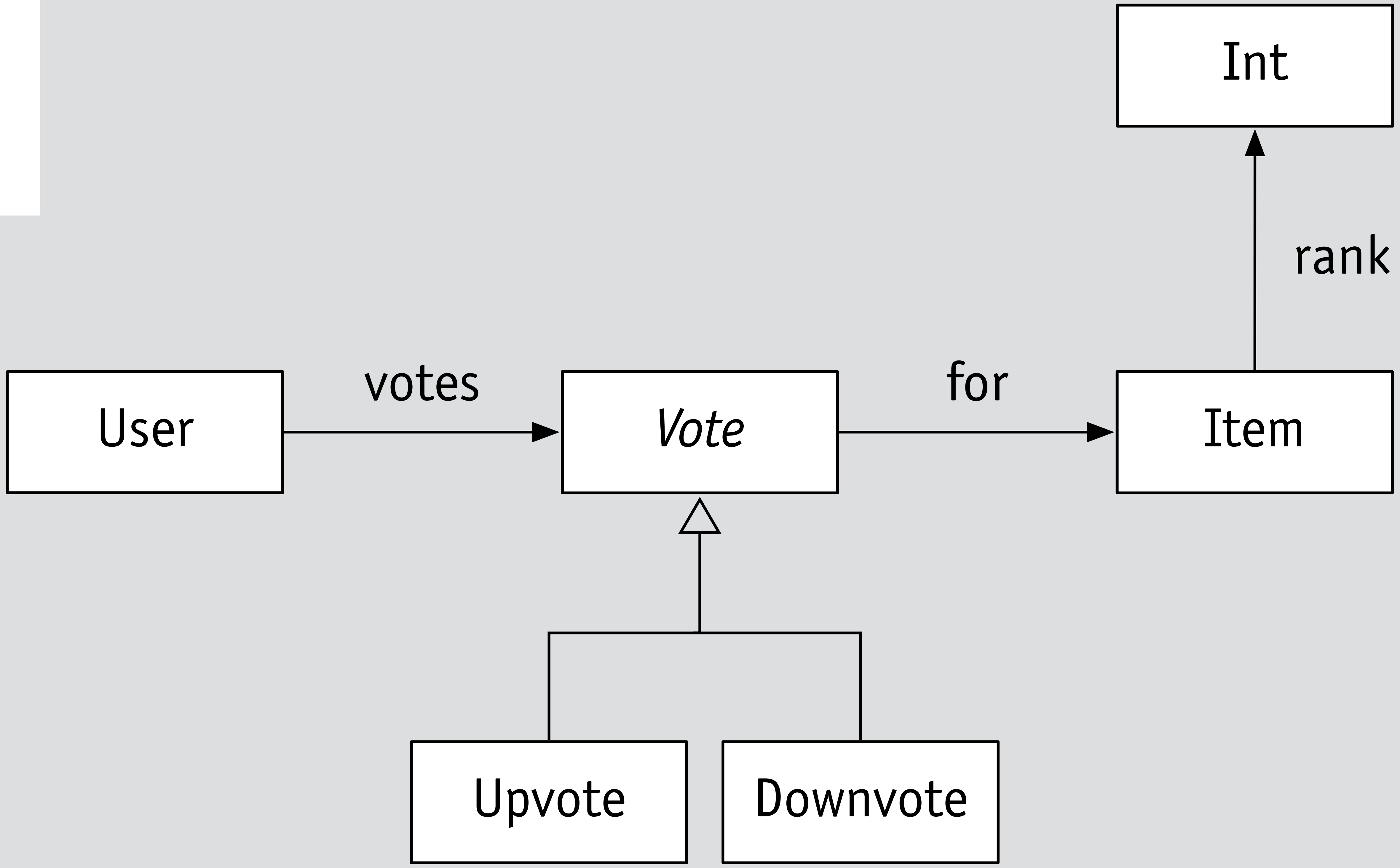
purpose rank items by popularity

state
votes: User -> set Vote
for: Vote -> one Item
Upvote, Downvote: set Vote
rank: Item -> one Int



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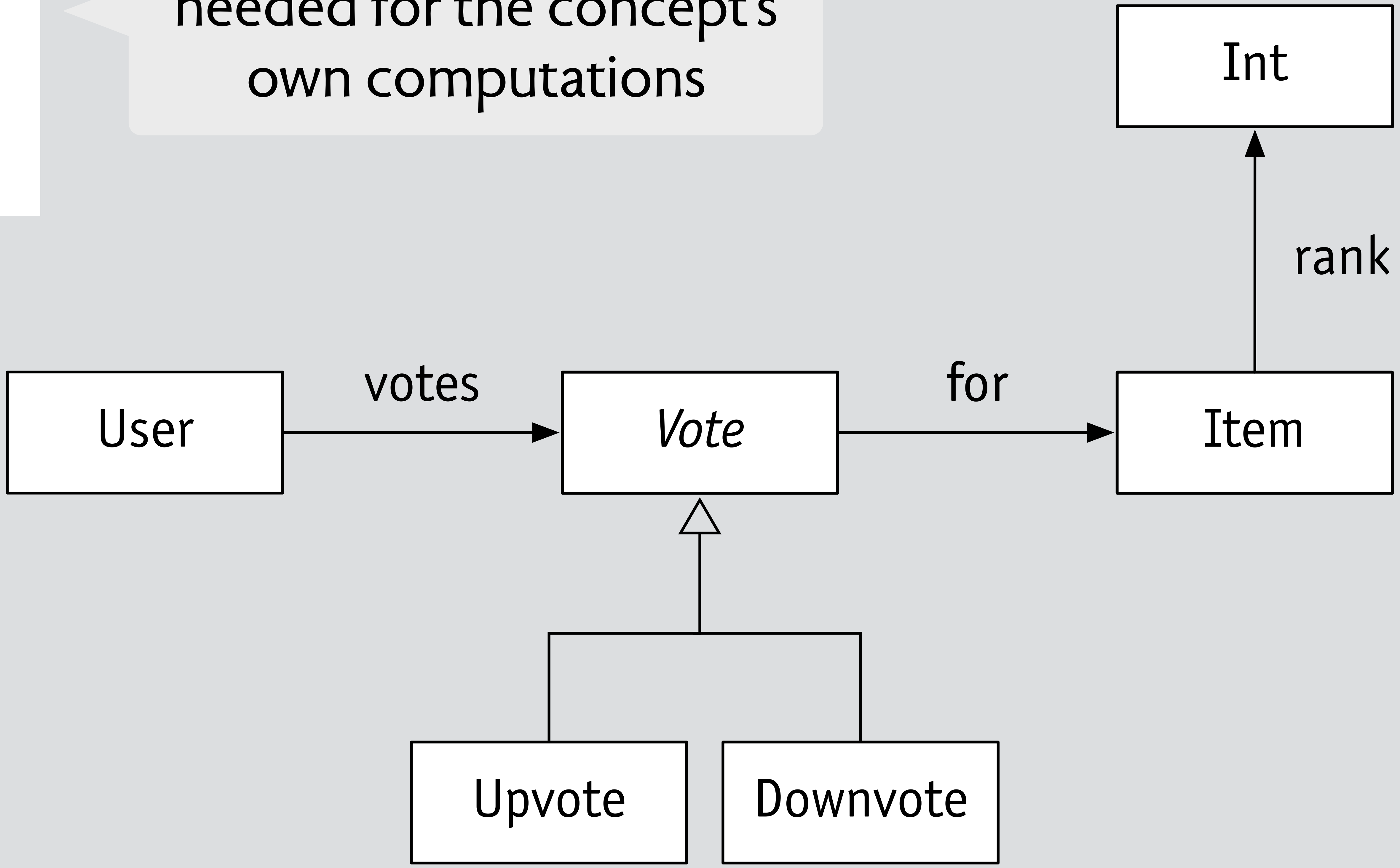
include in state **only** what's needed for the concept's own computations



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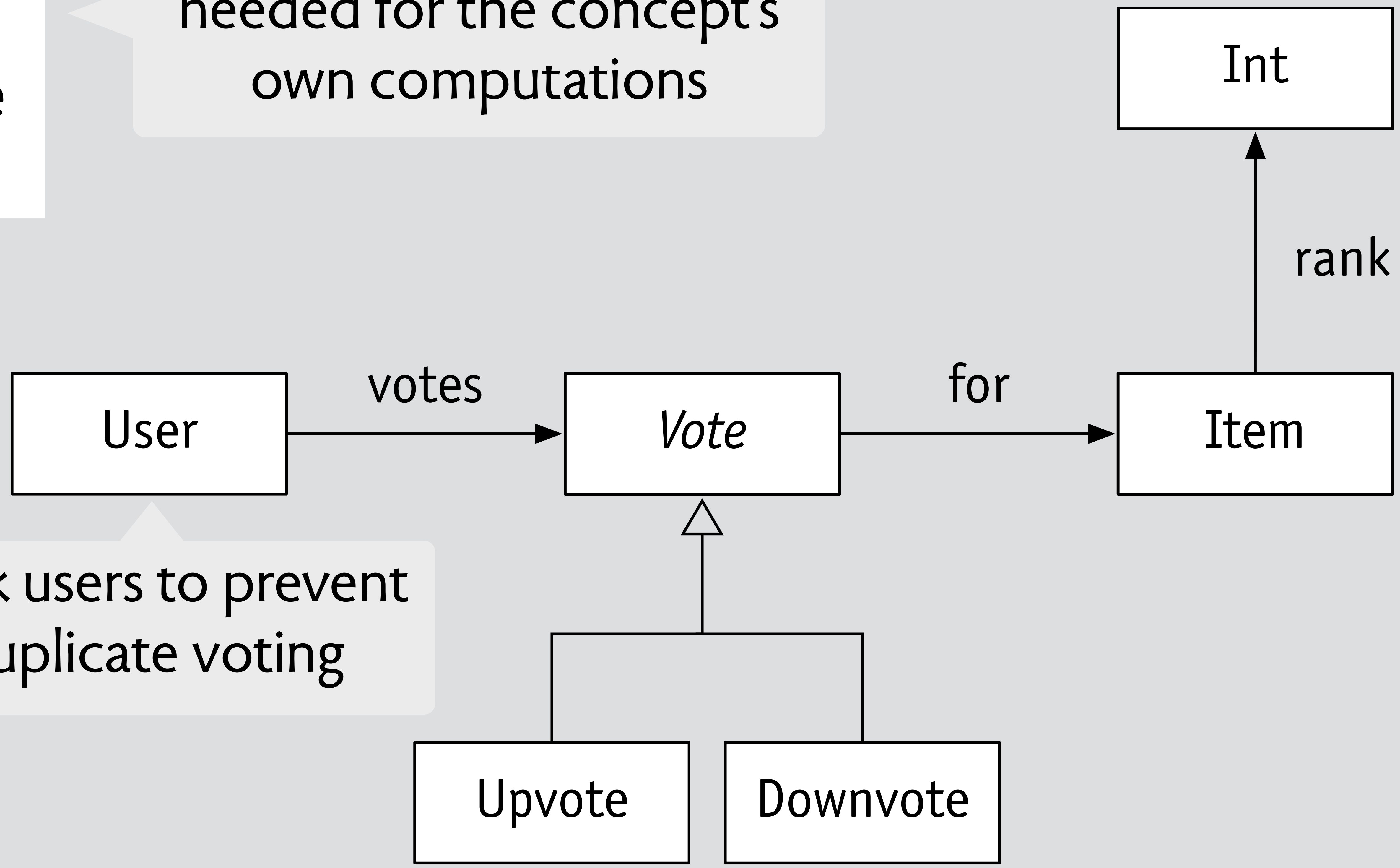

track users to prevent duplicate voting

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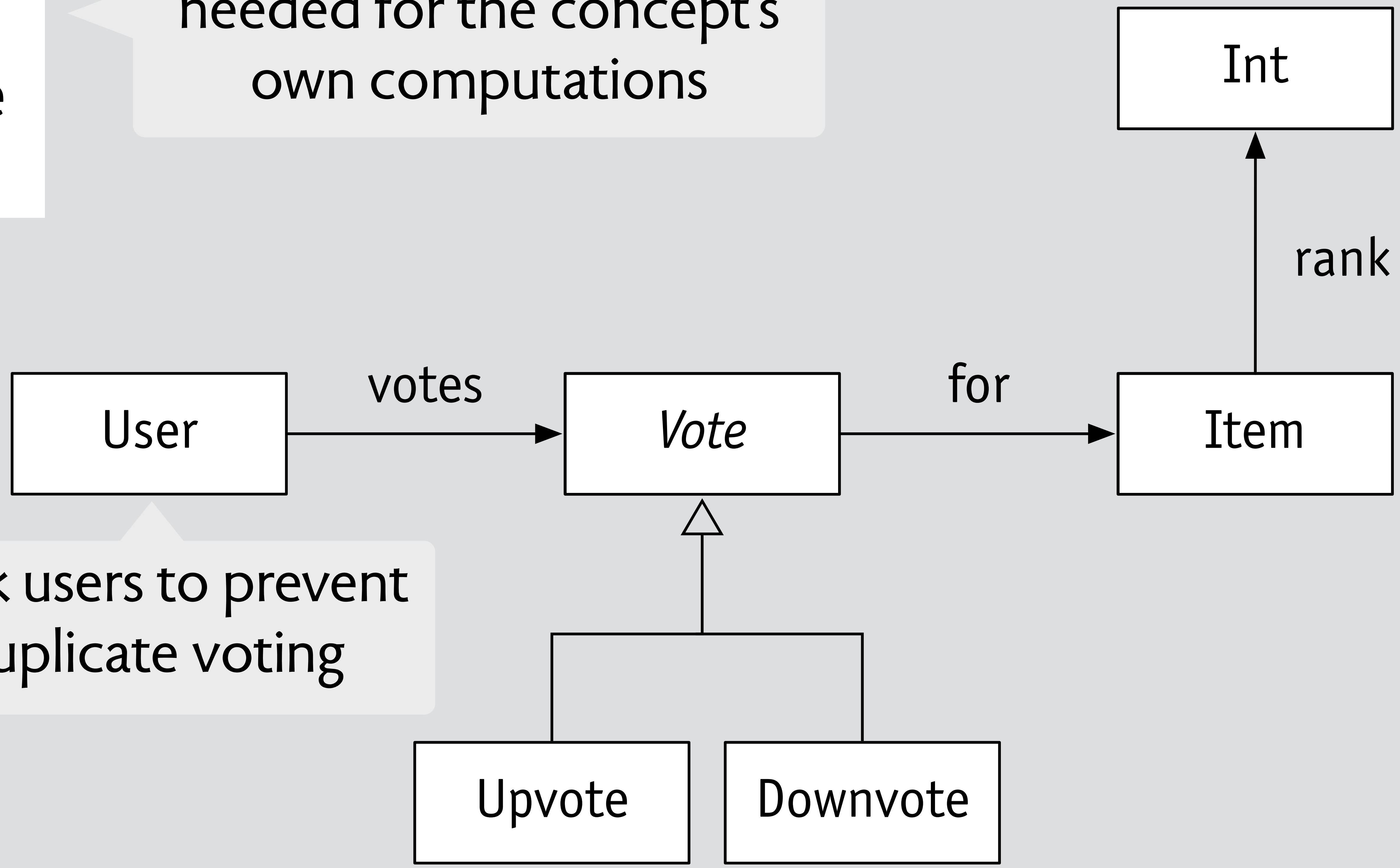

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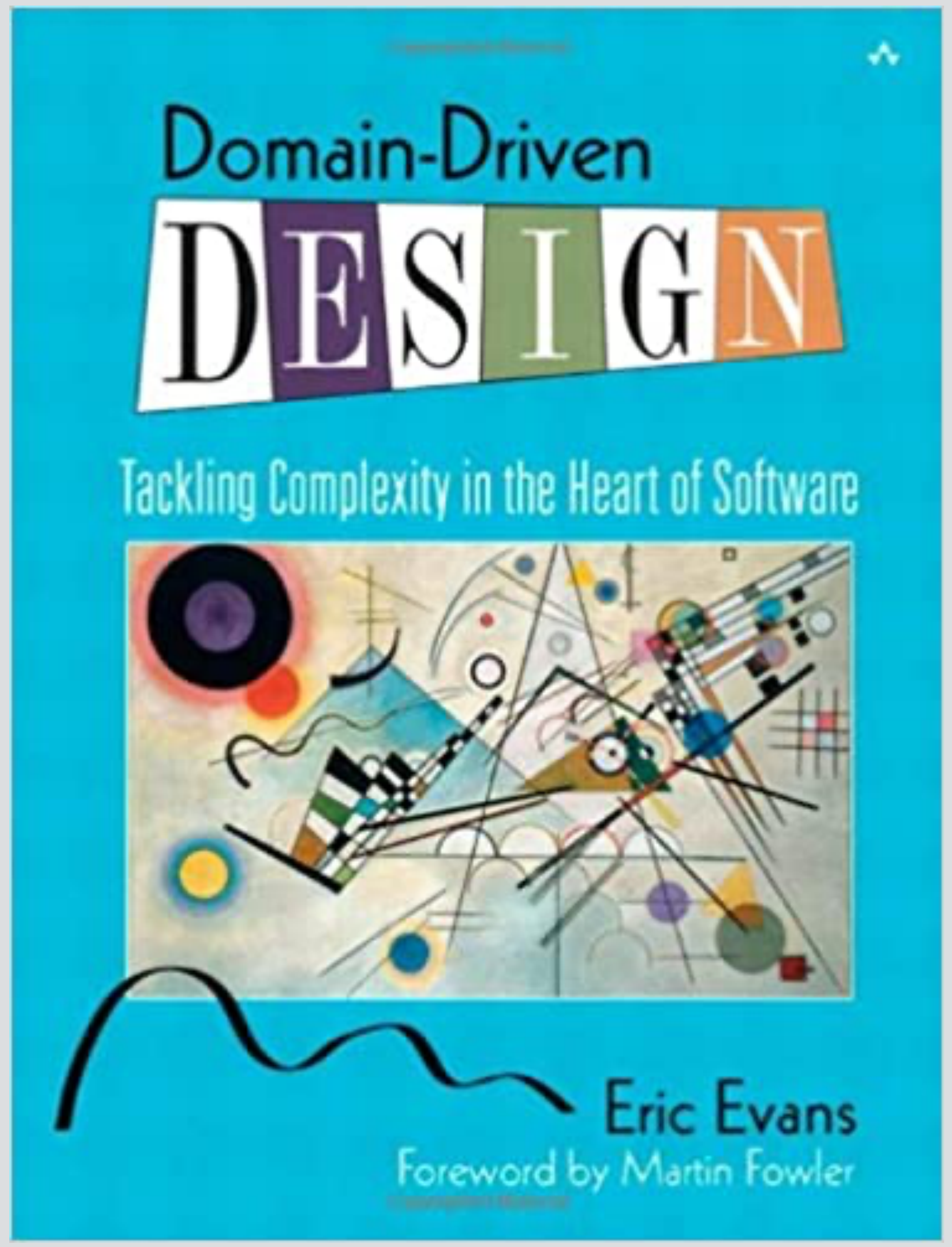
Domain-Driven
DESIGN
Tackling Complexity in the Heart of Software
Eric Evans
Foreword by Martin Fowler

like bounded context in DDD, but even more localized

a concept has actions

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actions capture the concept **behavior in full**

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downvote (i: Item, u: User)
  // no existing Downvote for i in u.votes
  // remove any Upvote for i from u.votes
  // add a Downvote for i in u.votes
  // update i.rank ...
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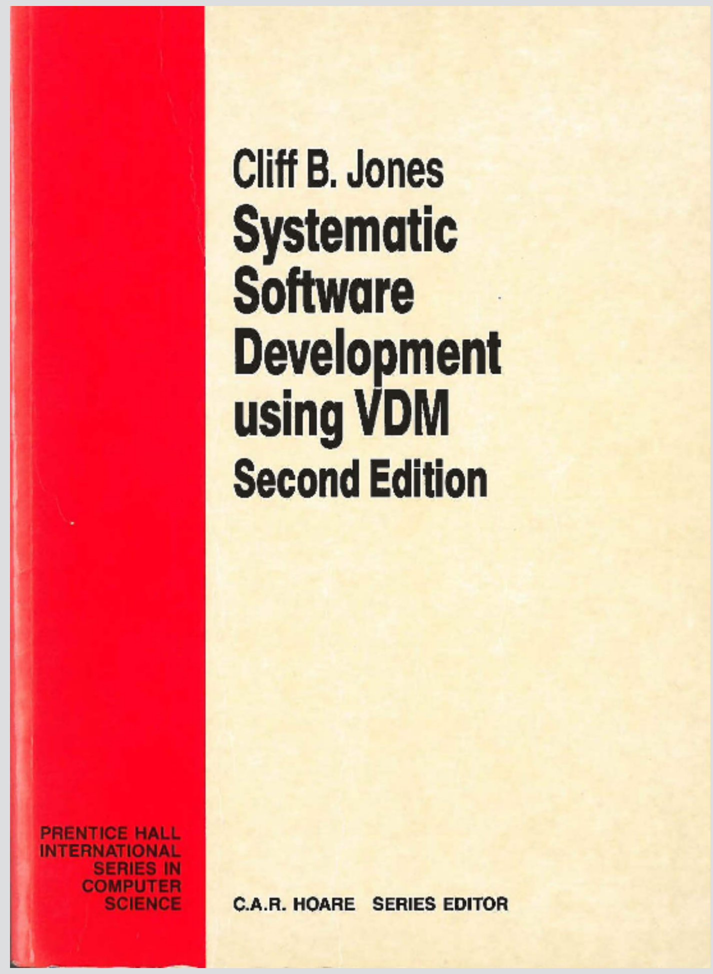
Cliff B. Jones
Systematic Software Development using VDM
Second Edition
PRENTICE HALL INTERNATIONAL SERIES IN COMPUTER SCIENCE
C.A.R. HOARE SERIES EDITOR

succinct specification
as actions on states
VDM (1986)
Z (1992)
Larch (1993)
Event-B (2006)
Alloy (2006)

a concept catalog entry

concept Upvote

related concepts
Recommendation, Reaction, ...

design variants
downvote as unvote
use age in ranking
weigh downvotes more

known issues
preventing double votes
(require login, use IP address, save cookie)
saving storage space
(freeze old posts and from user info)

typical uses
social media posts
comments on articles
Q&A responses

often used with
Karma, Session, ...

how to
compose
concepts?

how to extend behavior?

concept Upvote

actions
upvote (u: User, i: Item)
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how to extend behavior?

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you can't downvote an item
until you've received
N upvotes on your own items

how to extend behavior?

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define a new concept!
a hint: not just used by Upvote

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concept Karma

purpose privilege good users

state
karma: User -> one Int
contribs: User -> set Item

actions
contribute (u: User, i: Item)
reward (u: User, r: Int)
permit (u: User, r: Int)

concept Upvote

actions
upvote (u: User, i: Item)
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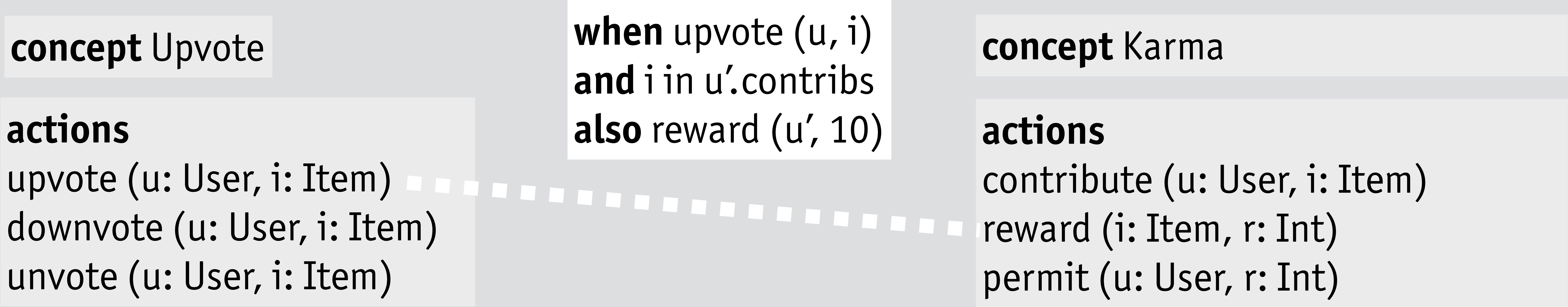

concept Upvote

actions
upvote (u: User, i: Item)
downvote (u: User, i: Item)
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when upvote (u, i)
and i in u′.contribs
also reward (u′, 10)

concept Karma

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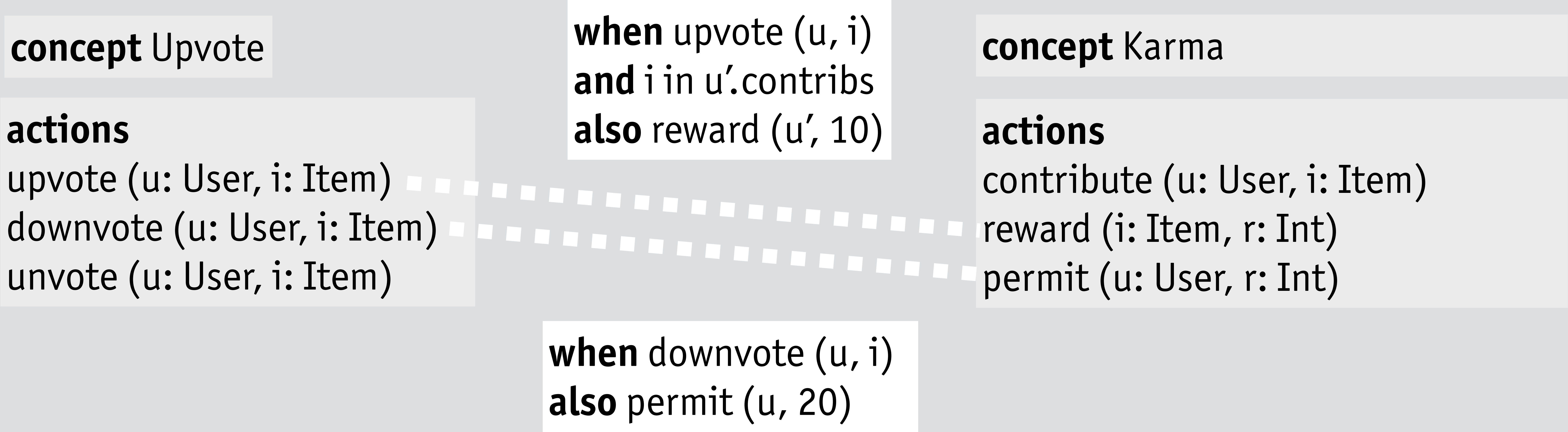

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when downvote (u, i)
also permit (u, 20)

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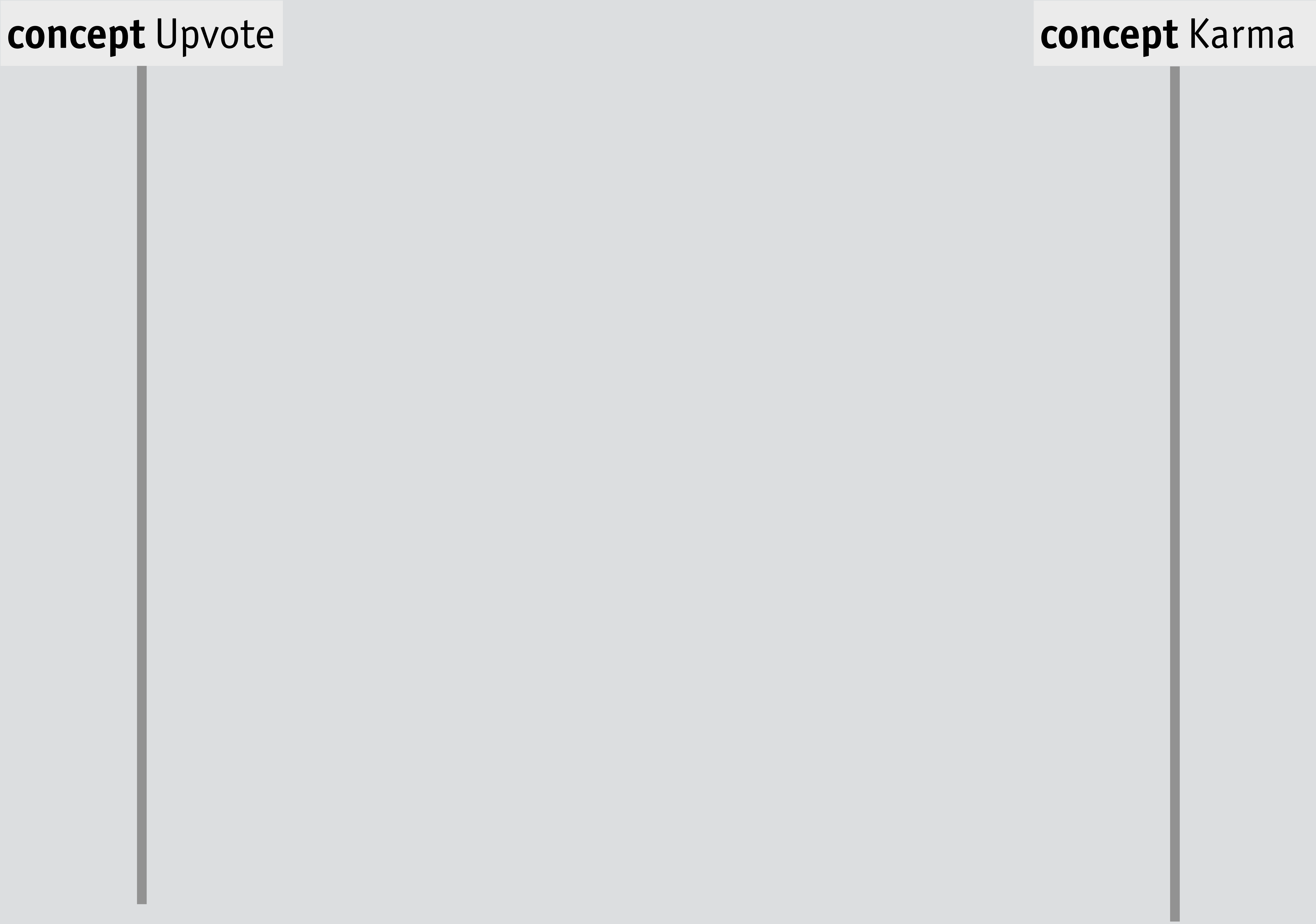

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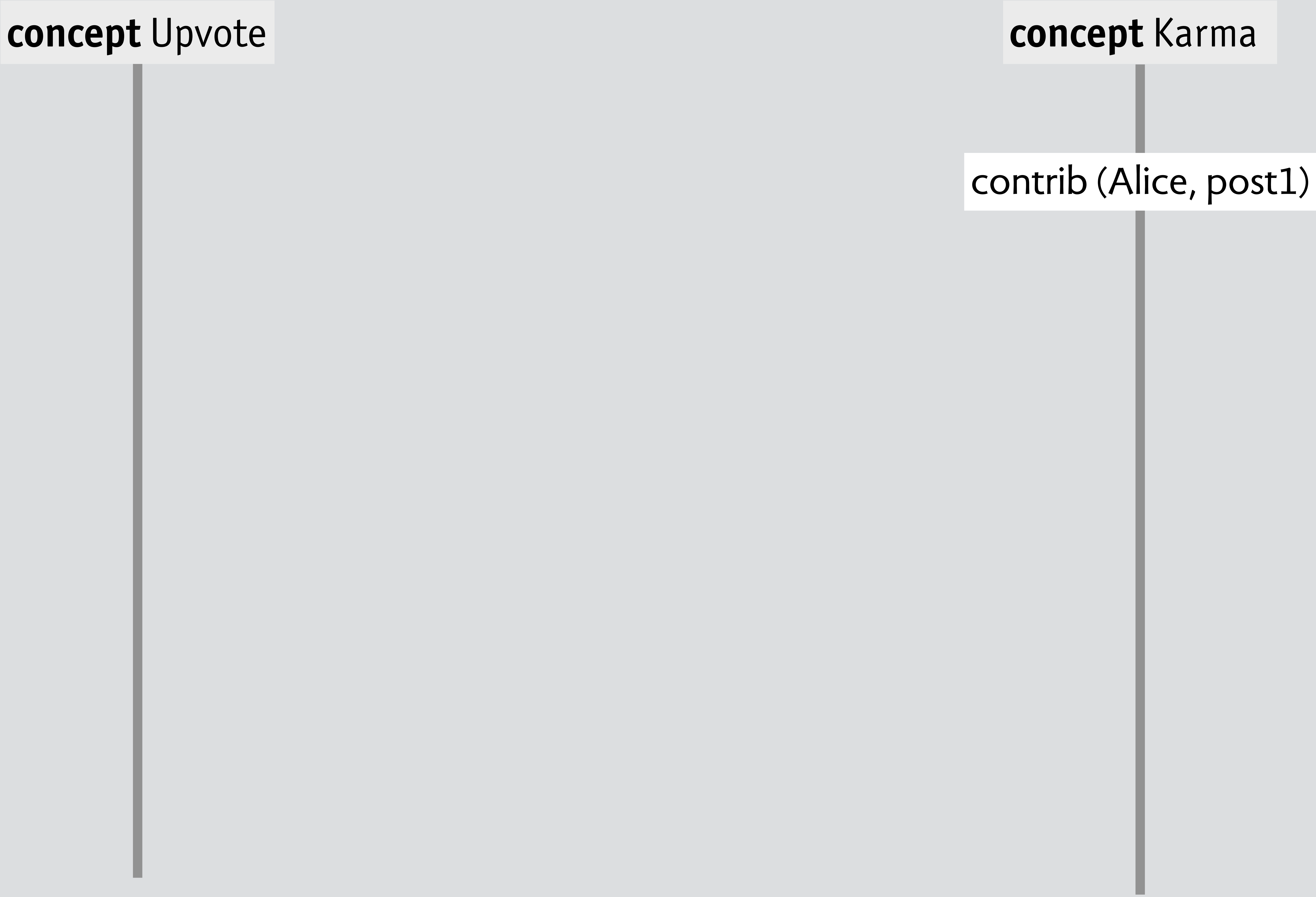
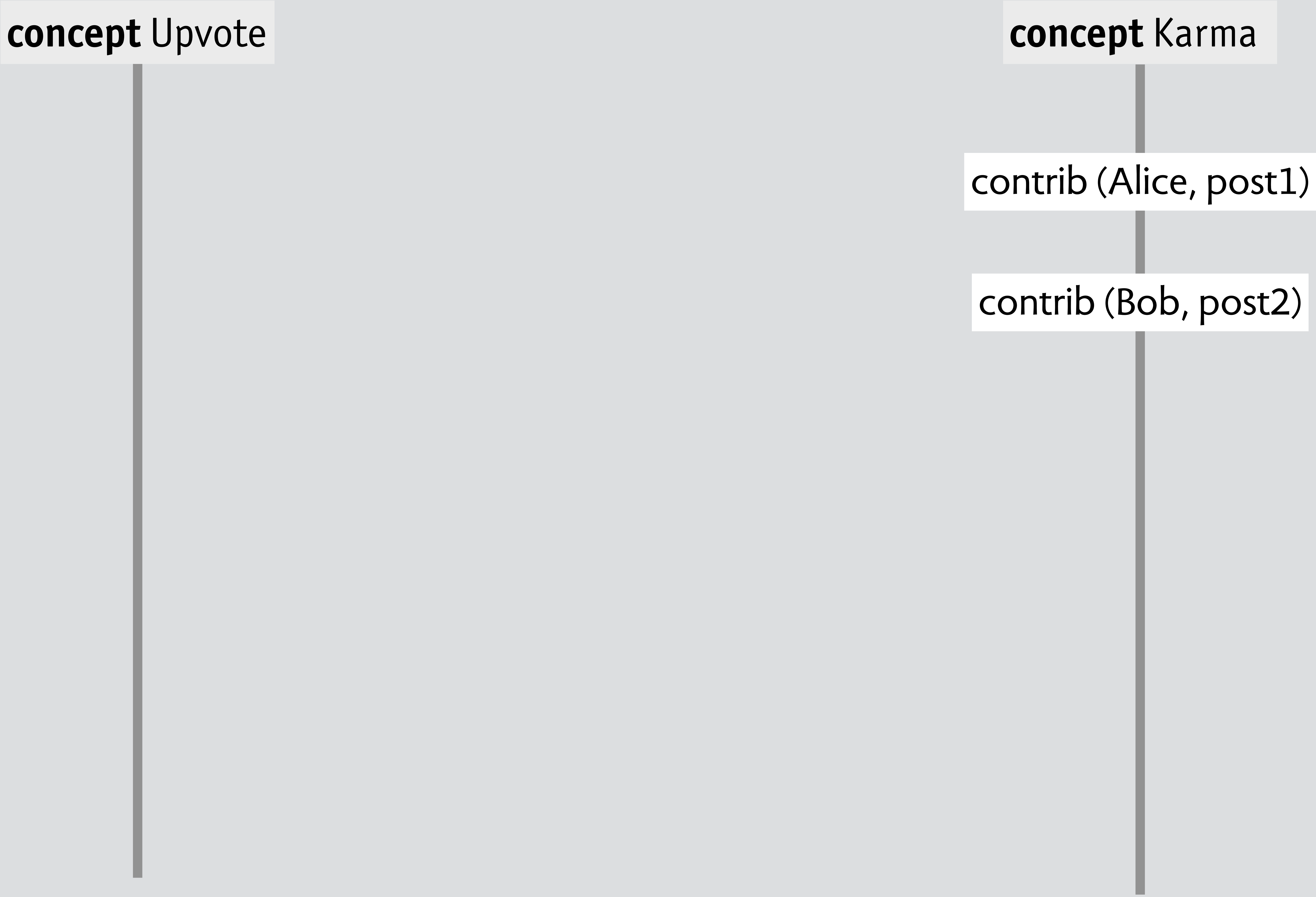


concept Upvote

concept Karma

contrib (Alice, post1)

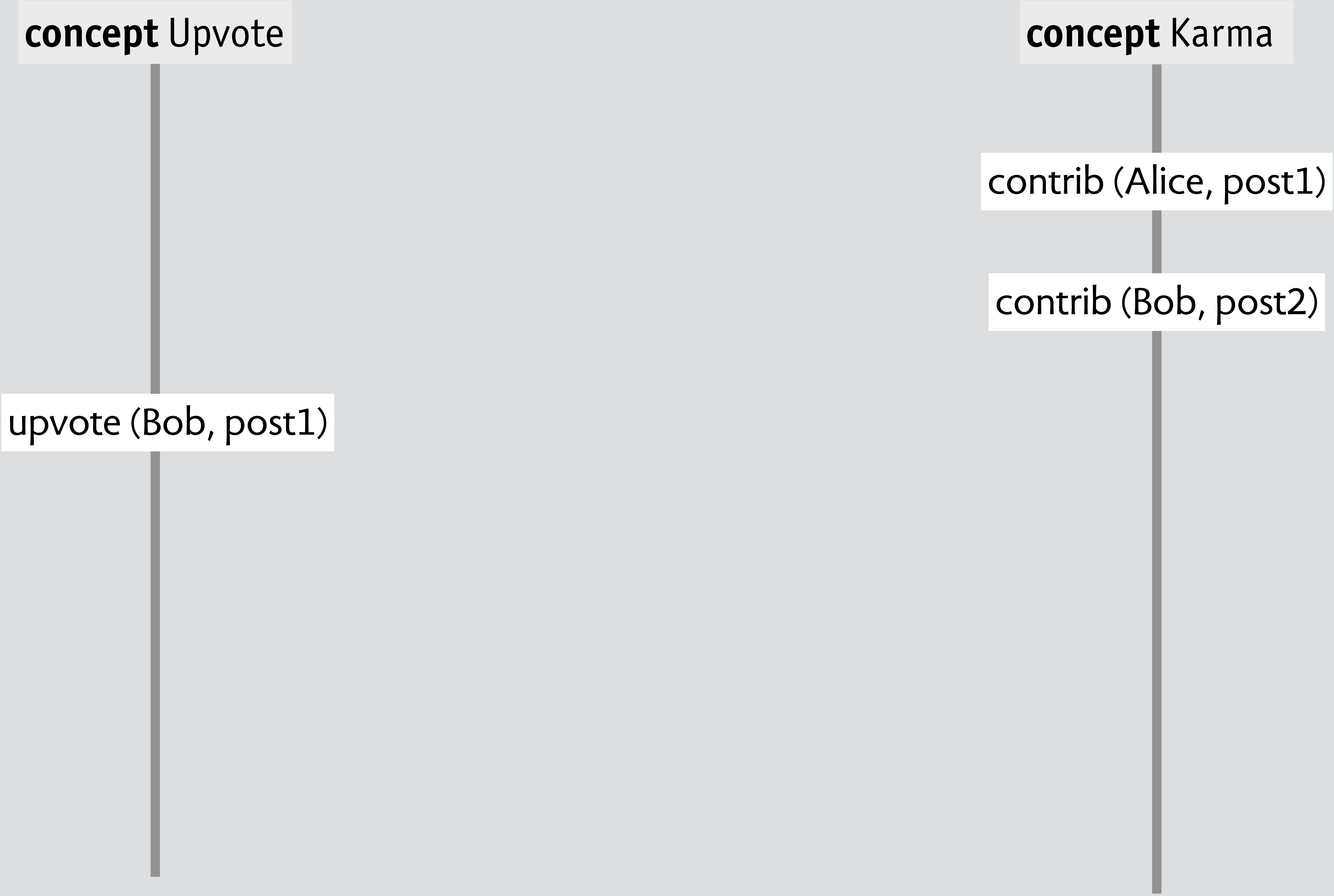


concept Upvote

concept Karma

contrib (Alice, post1)

contrib (Bob, post2)



concept Upvote

upvote (Bob, post1)

concept Karma

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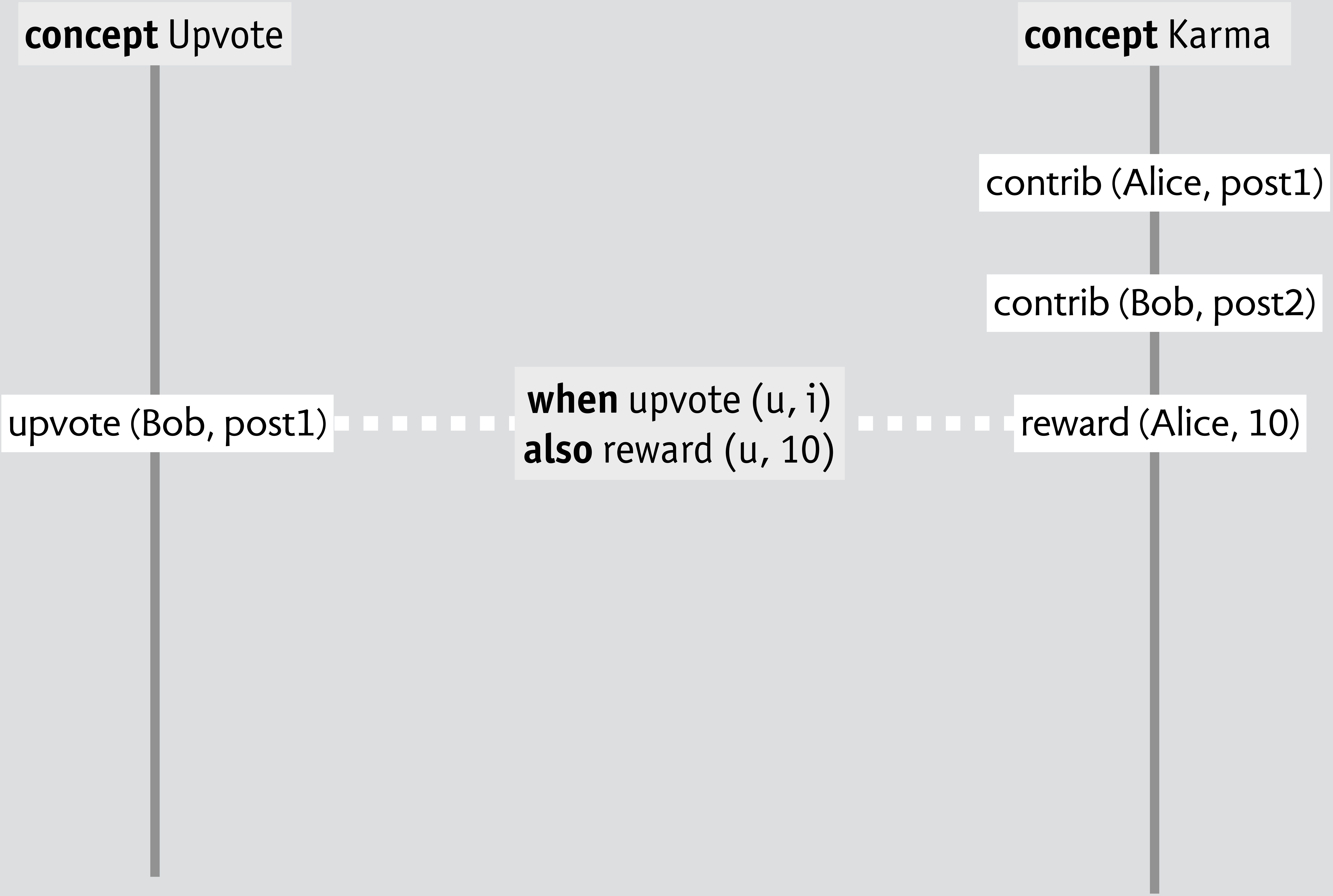
contrib (Bob, post2)



concept Upvote

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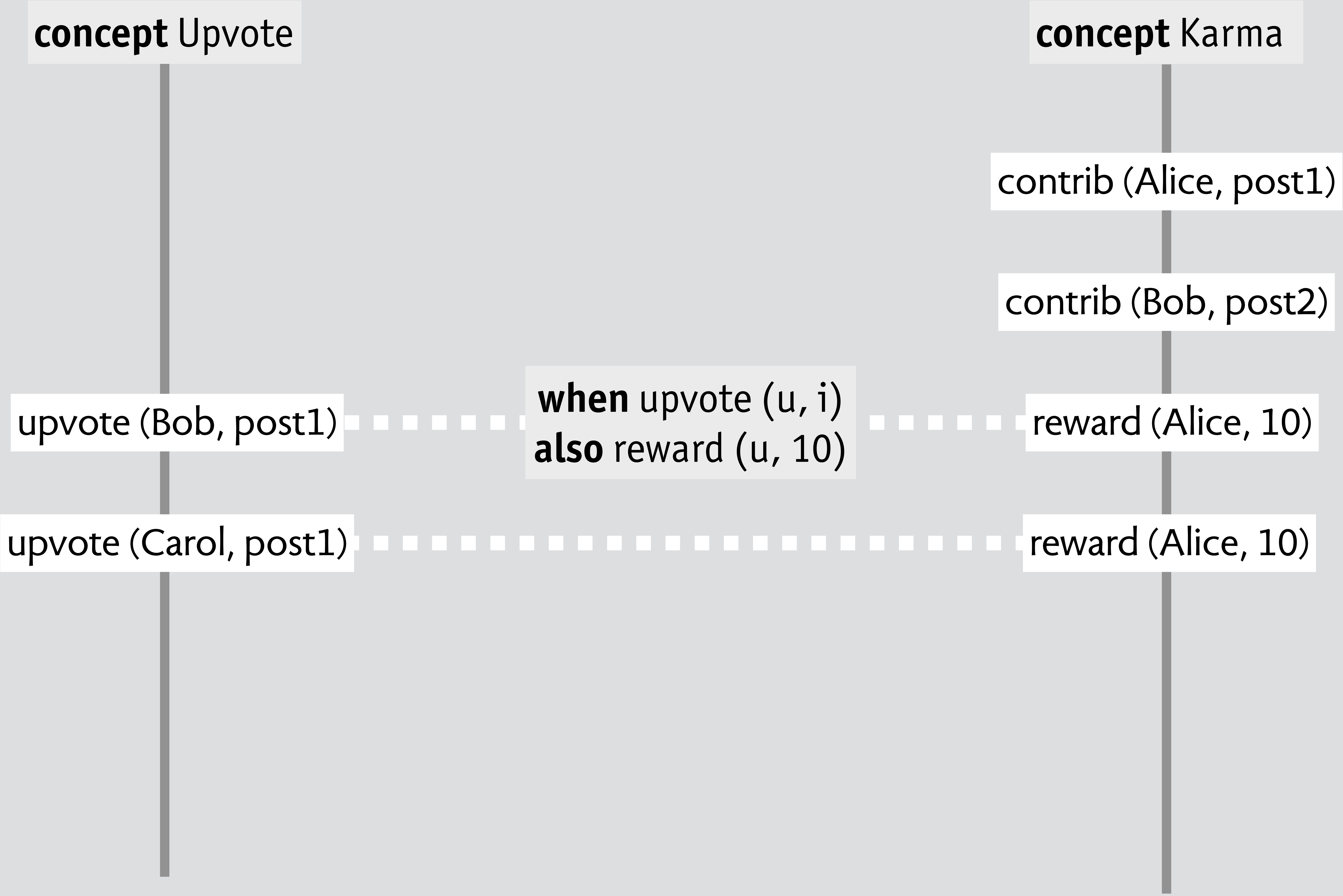
contrib (Alice, post1)

contrib (Bob, post2)

upvote (Bob, post1)

when upvote (u, i)
also reward (u, 10)

reward (Alice, 10)



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contrib (Bob, post2)

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also reward (u, 10)

reward (Alice, 10)

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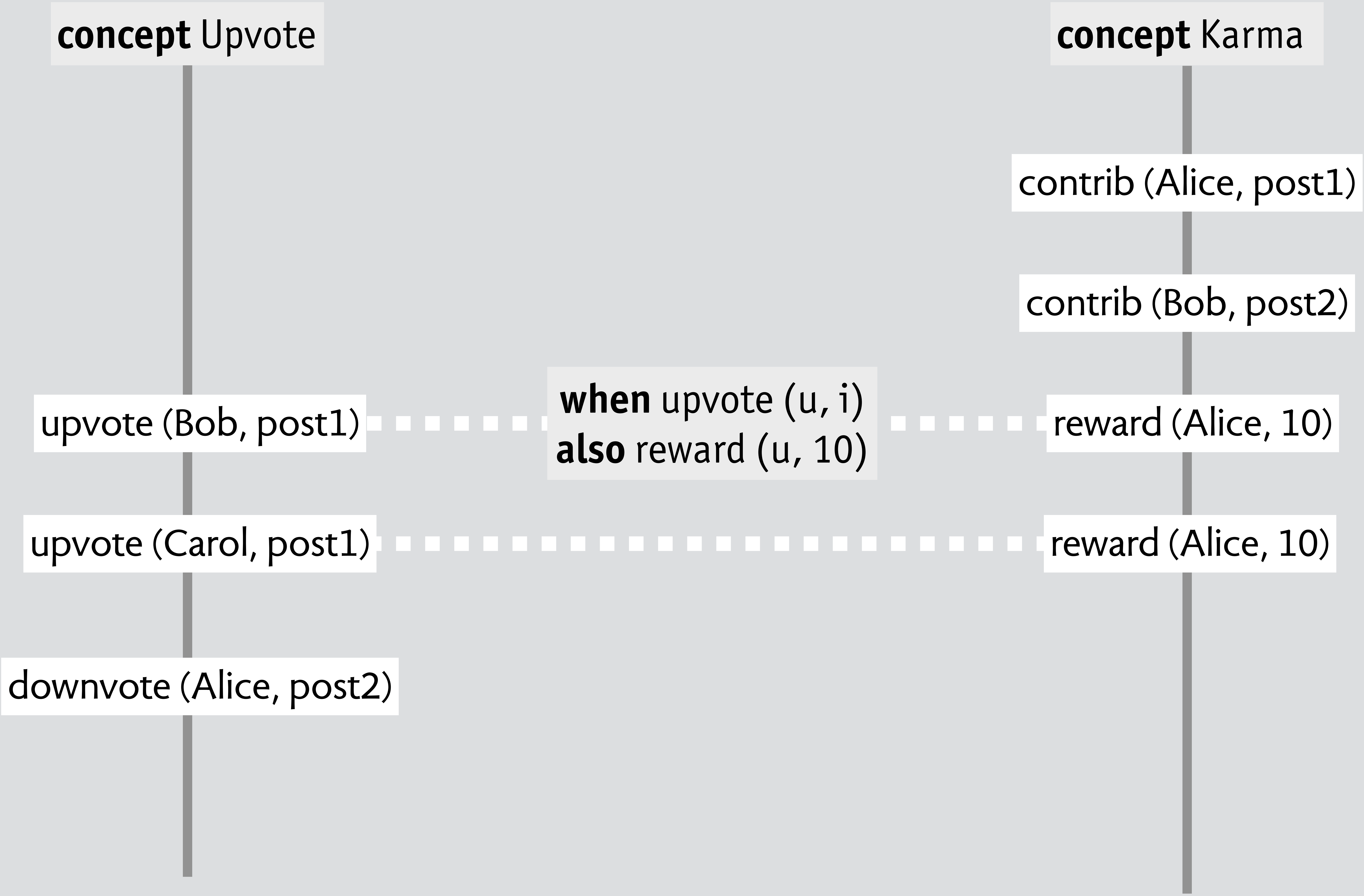
reward (Alice, 10)



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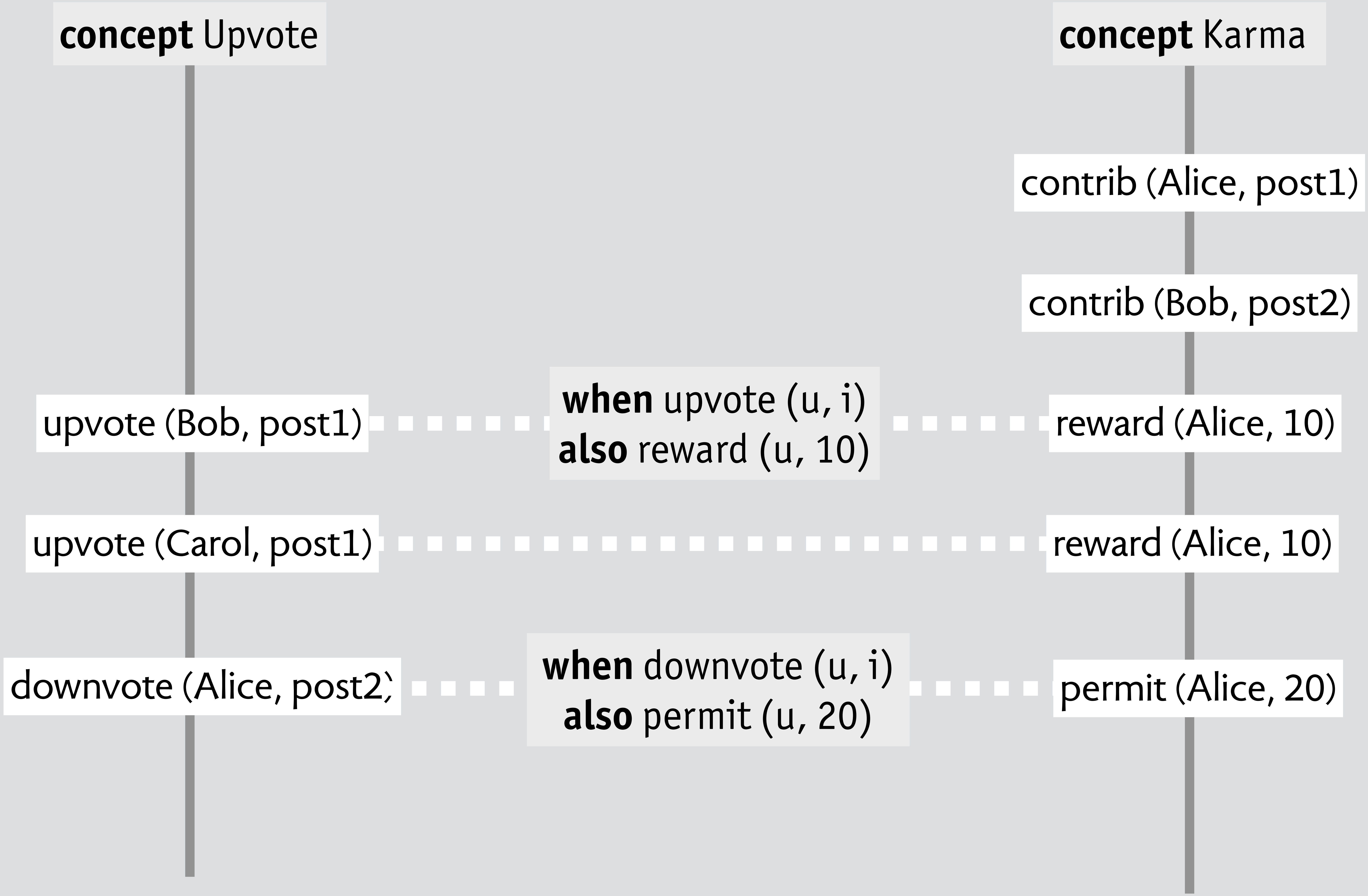
reward (Alice, 10)

downvote (Alice, post2)



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reward (Alice, 10)

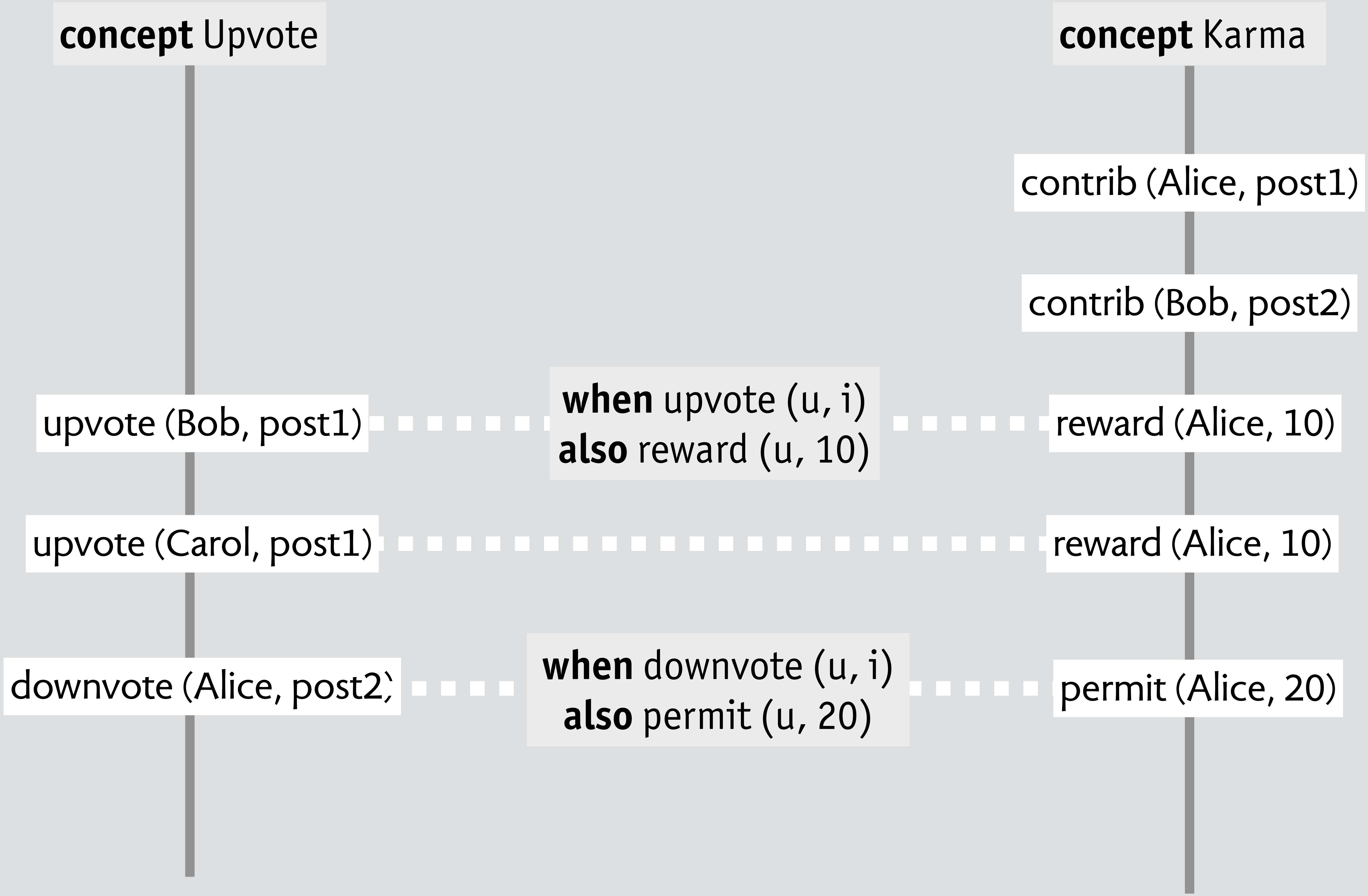
upvote (Carol, post1)

reward (Alice, 10)

downvote (Alice, post2)

when downvote (u, i)
also permit (u, 20)

permit (Alice, 20)



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when upvote (u, i)
also reward (u, 10)

reward (Alice, 10)

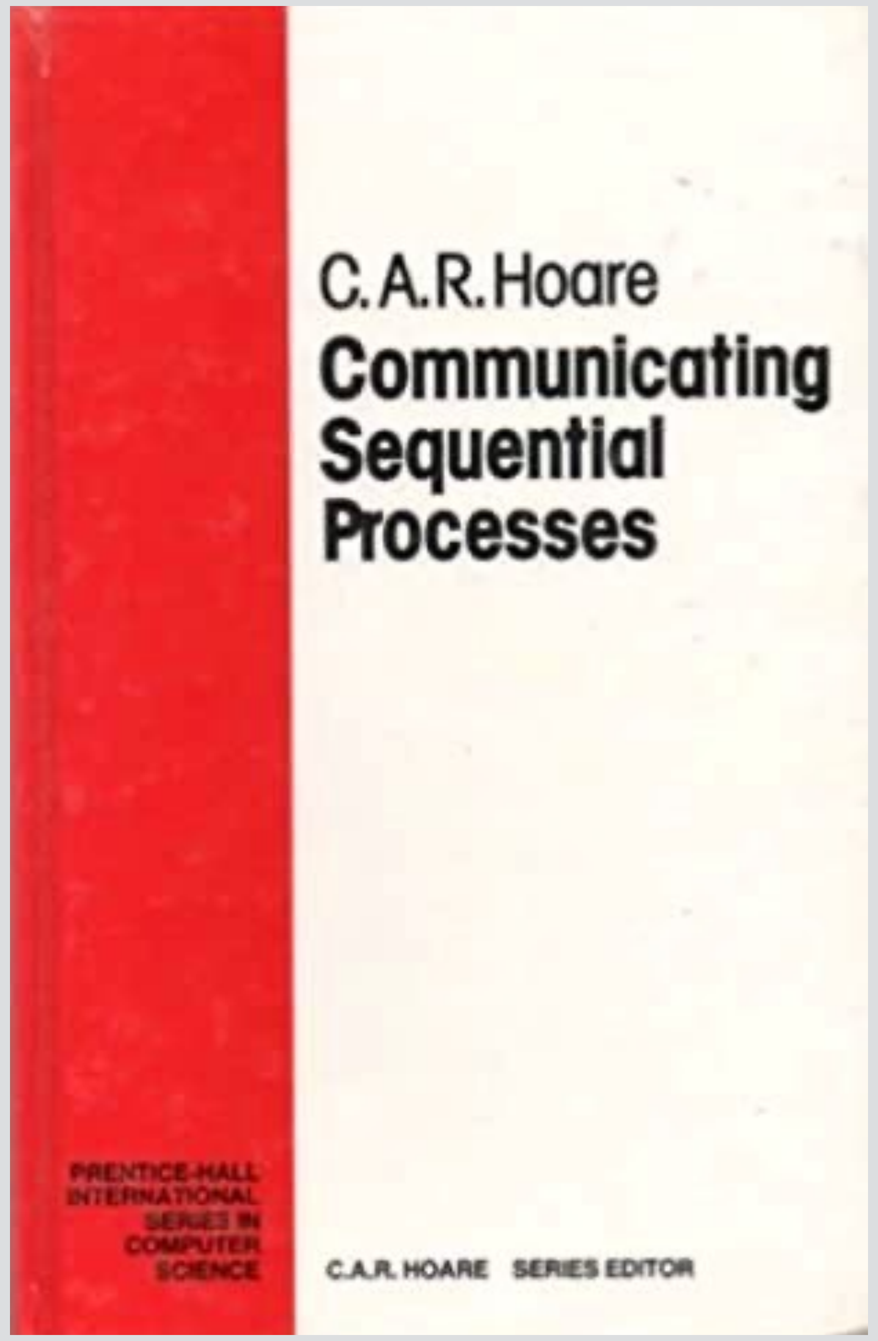
upvote (Carol, post1)

reward (Alice, 10)

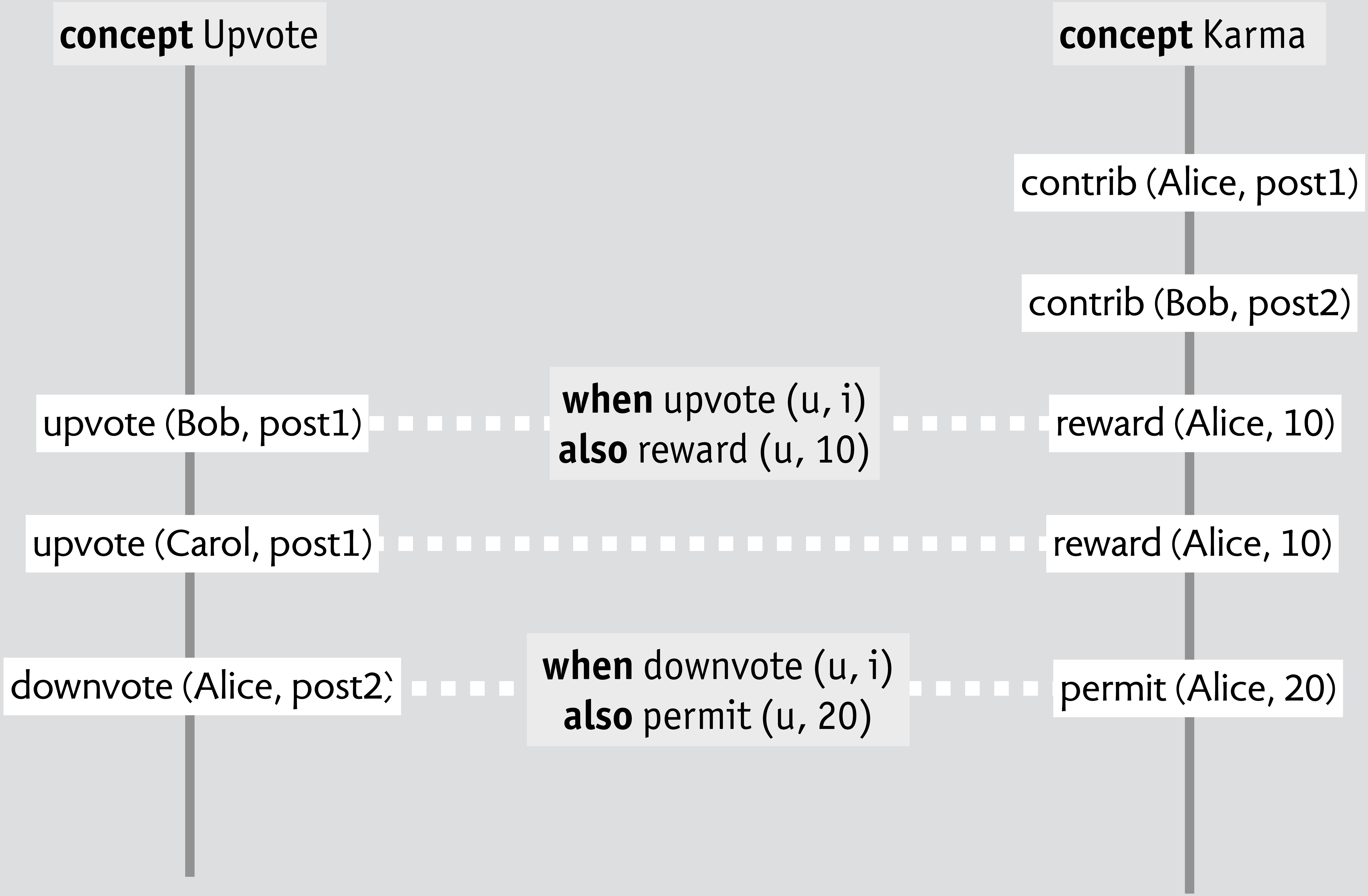
downvote (Alice, post2)

when downvote (u, i)
also permit (u, 20)

permit (Alice, 20)


C.A.R.Hoare
Communicating Sequential Processes
PRENTICE-HALL INTERNATIONAL SERIES IN COMPUTER SCIENCE
C.A.R. HOARE SERIES EDITOR

composition uses event sync from Hoare's CSP



concept Upvote

concept Karma

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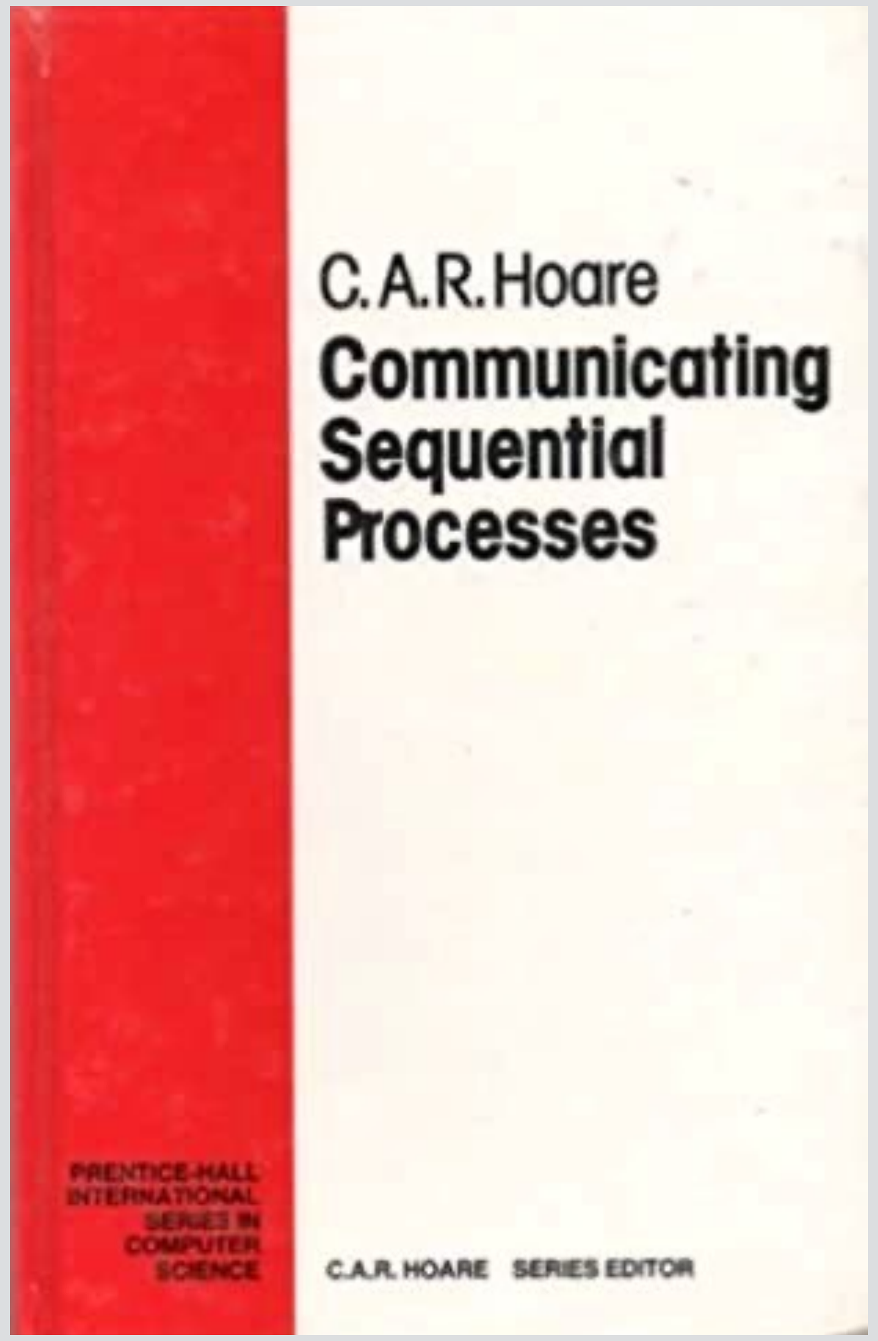
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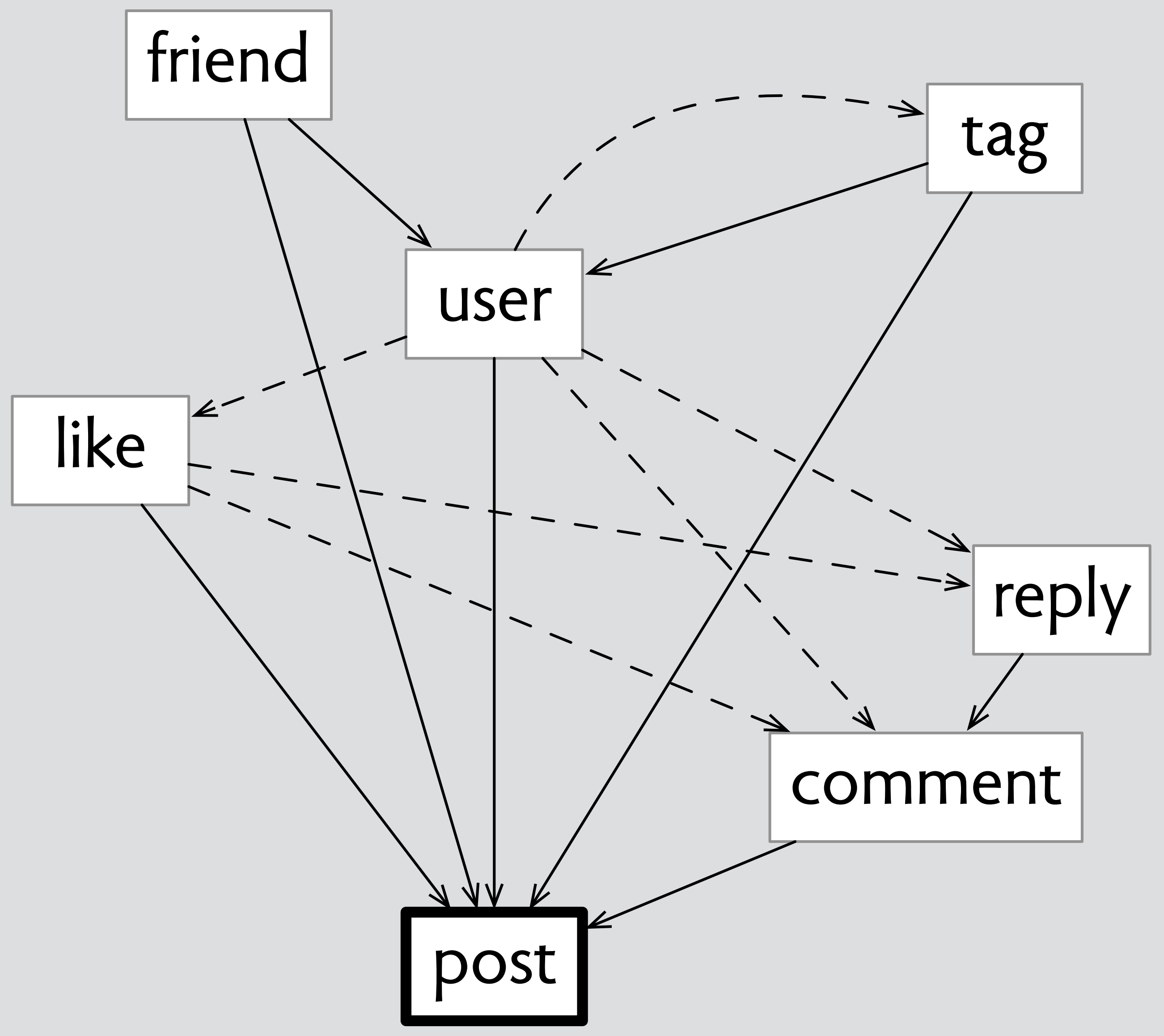
no concept coupling
concepts preserve properties

so what can
you do with
concepts?

characterize apps and families



Facebook

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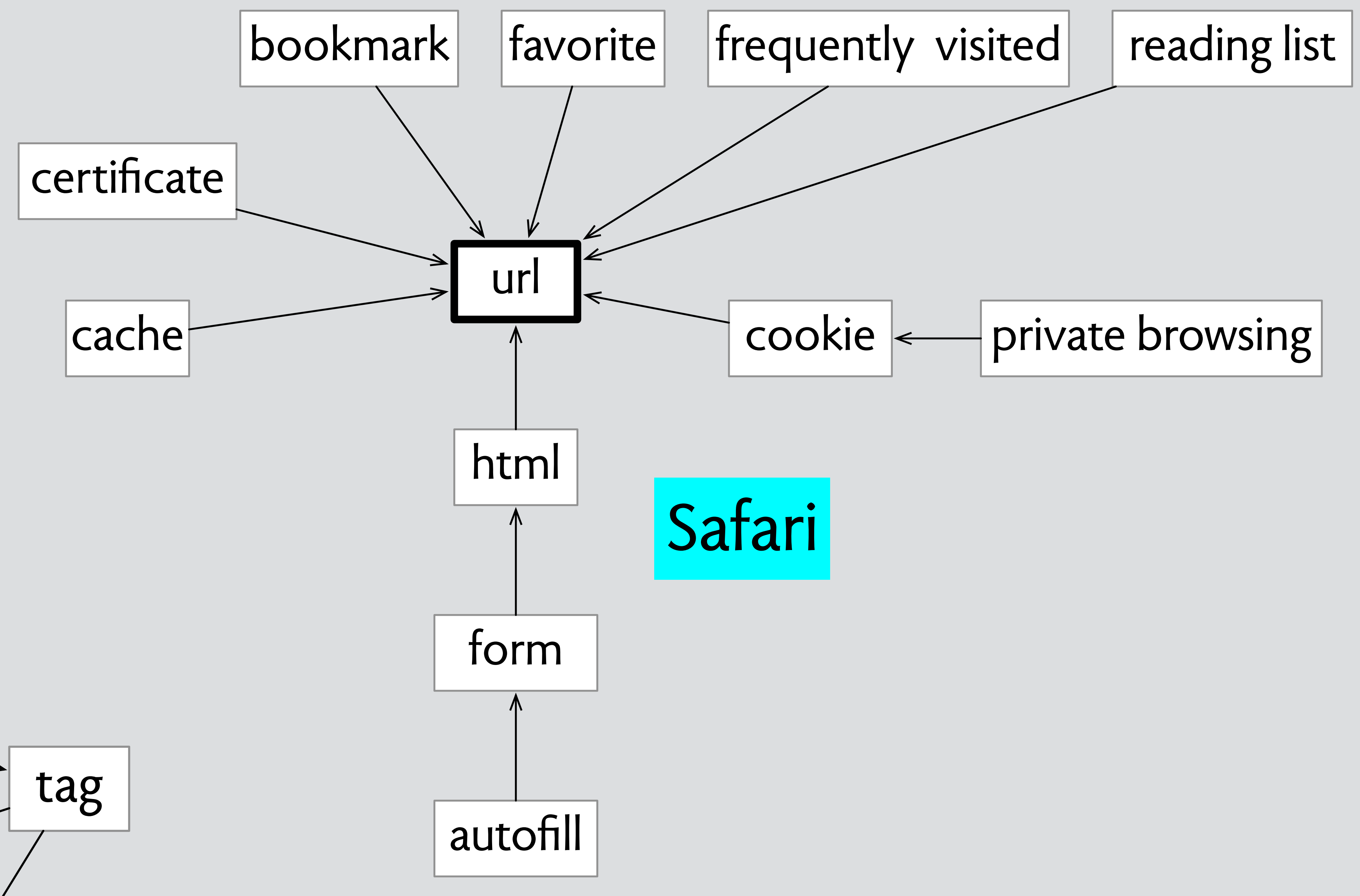
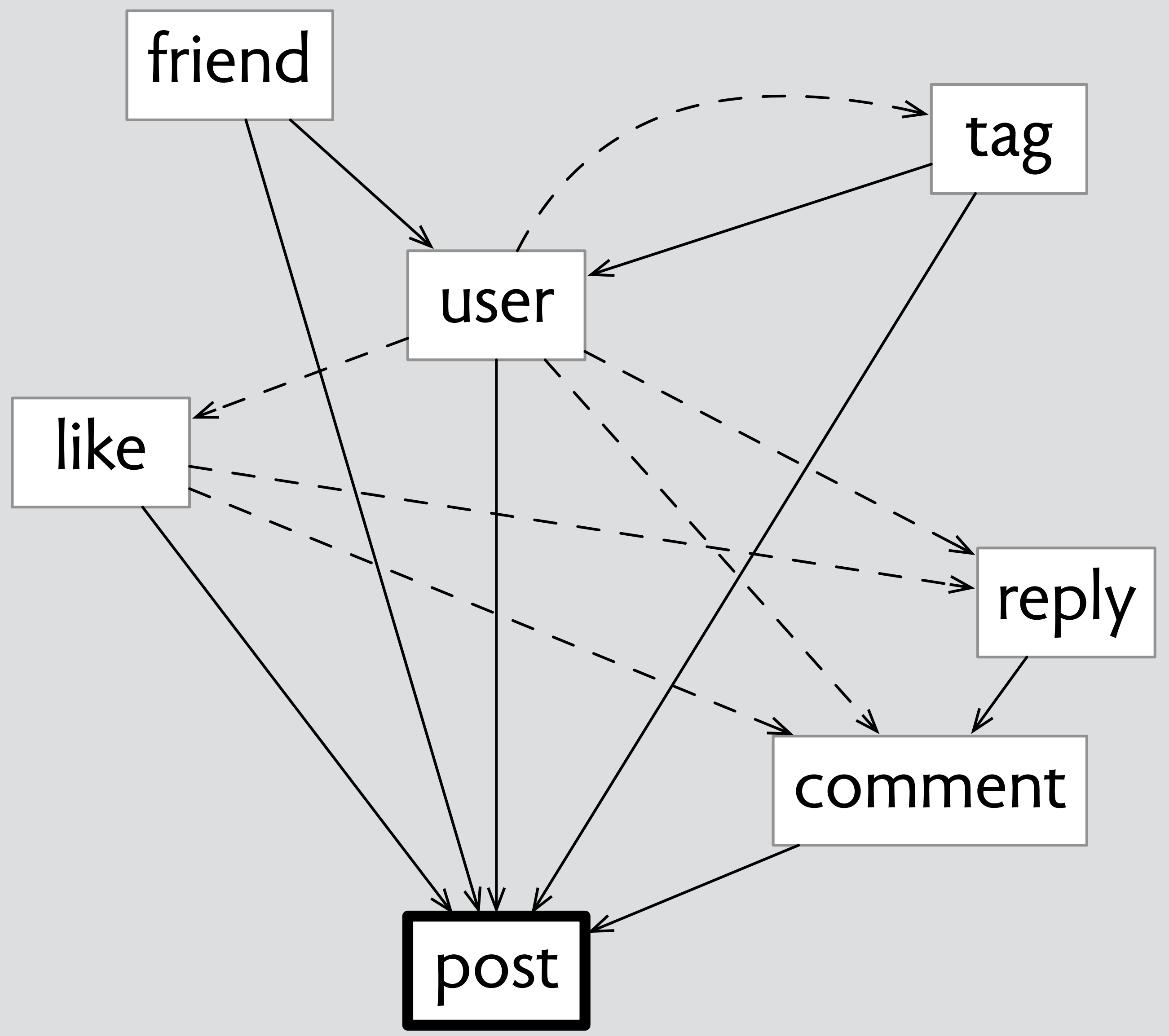


Safari



Facebook

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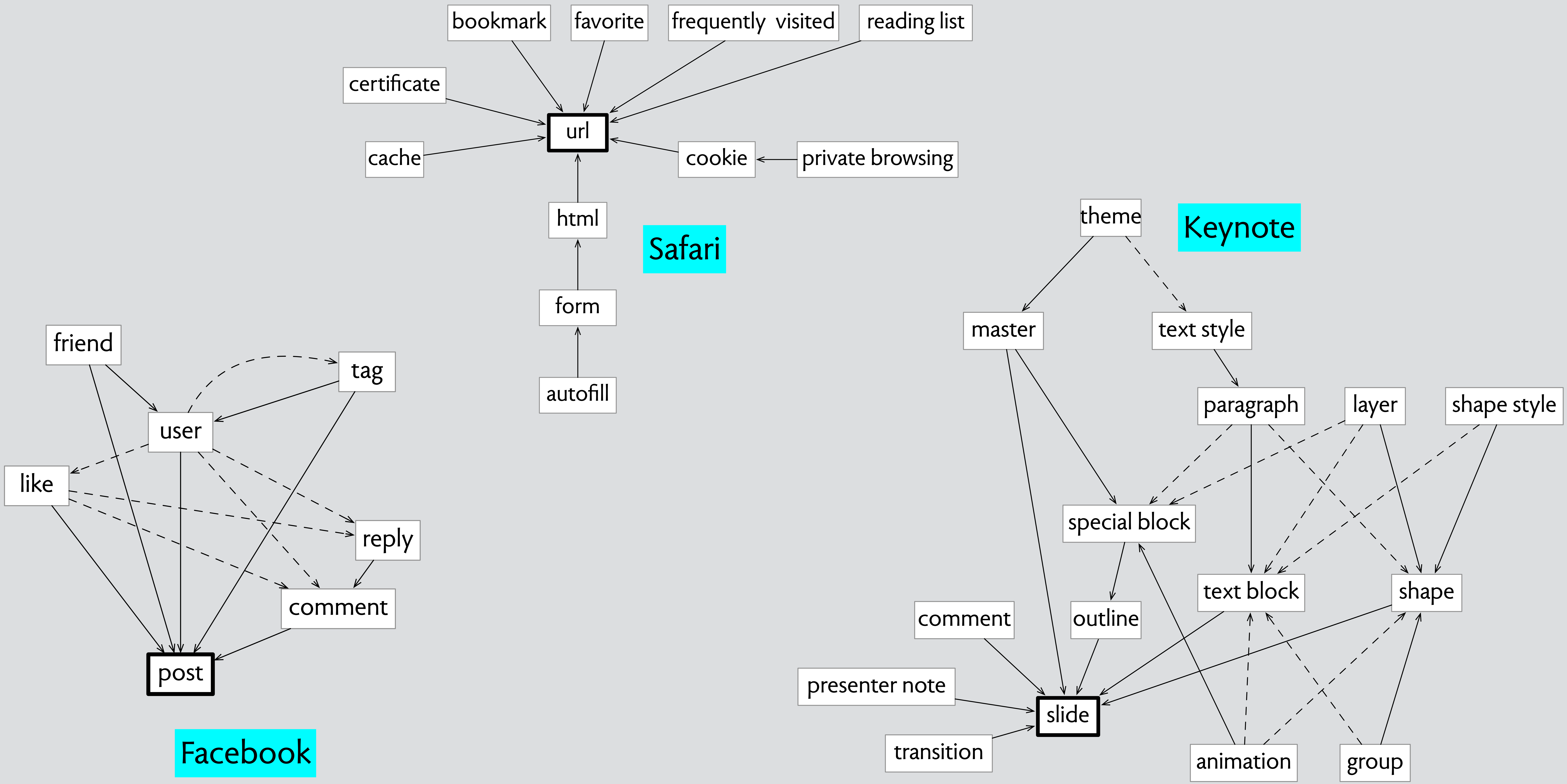
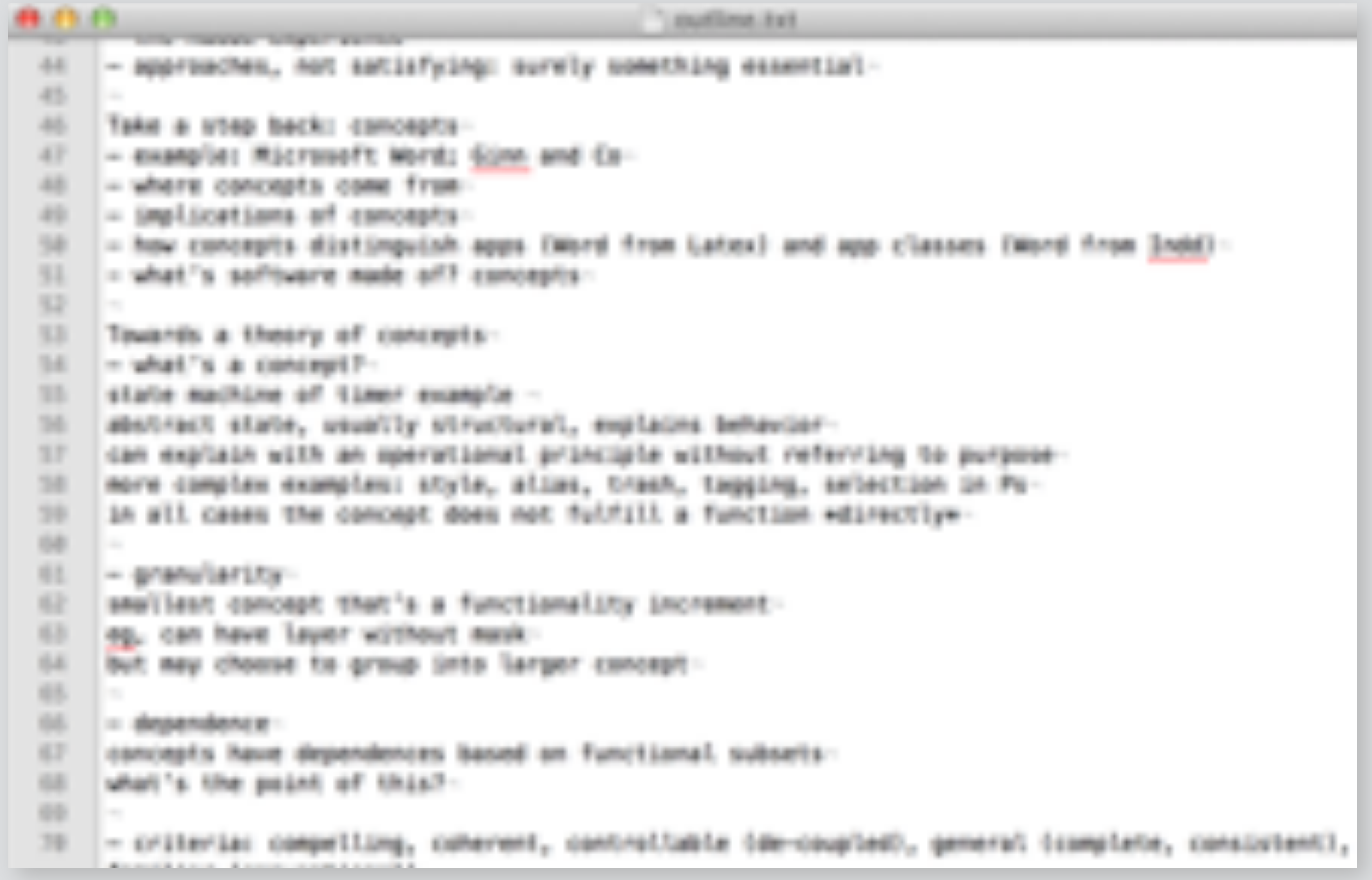


characterize apps & families



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- approaches, not satisfying: surely something essential

Take a step back: concepts
- example: Microsoft Word: Ginn and Co
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- how concepts distinguish apps (Word from Latex) and app classes (Word from Indd)
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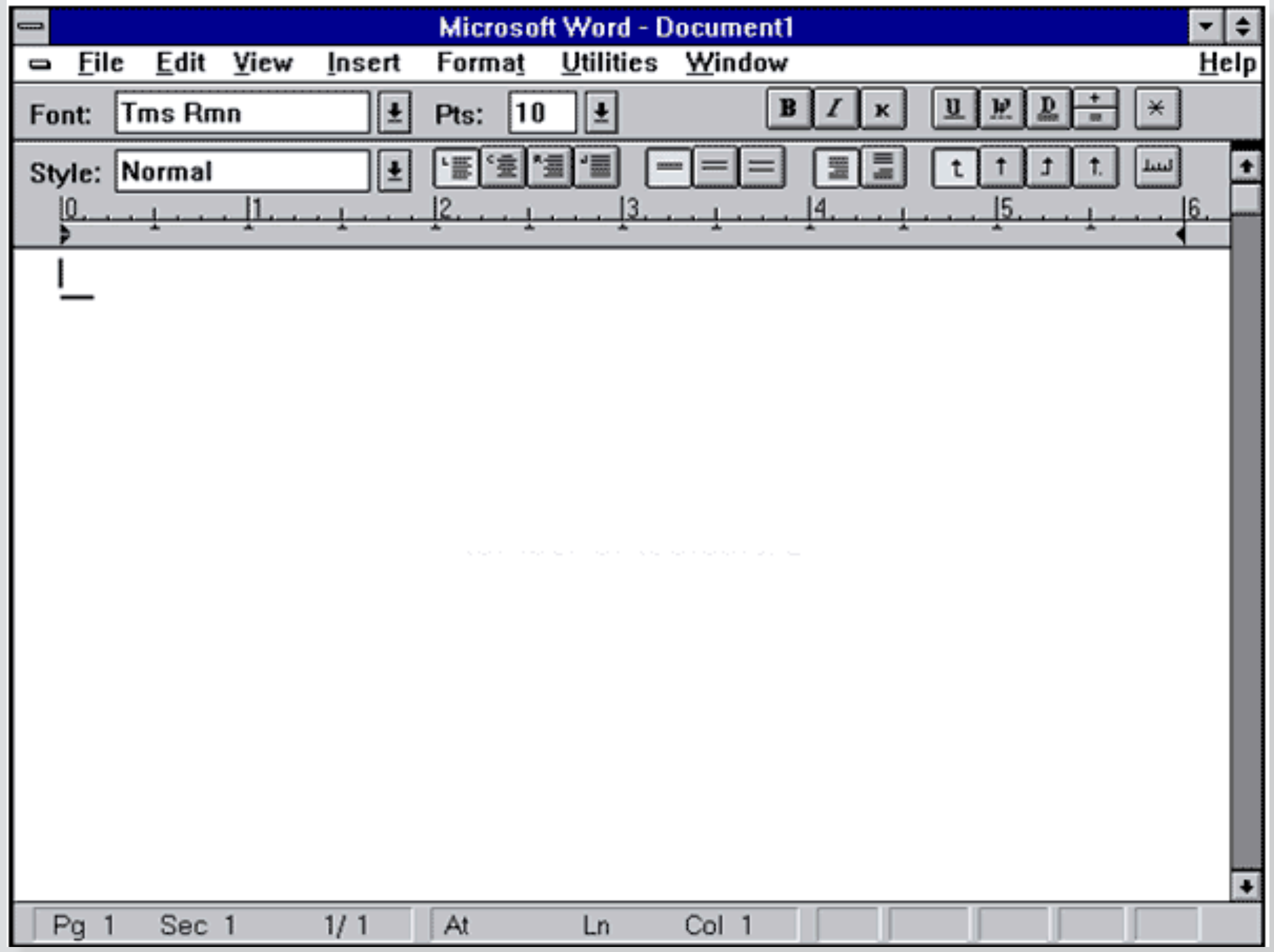
Towards a theory of concepts
- what's a concept?
state machine of timer example
abstract state, usually structural, explains behavior
can explain with an operational principle without referring to purpose
more complex examples: style, alias, trash, tagging, selection in Ps
in all cases the concept does not fulfill a function *directly*

- granularity
smallest concept that's a functionality increment
eg, can have layer without mask
but may choose to group into larger concept

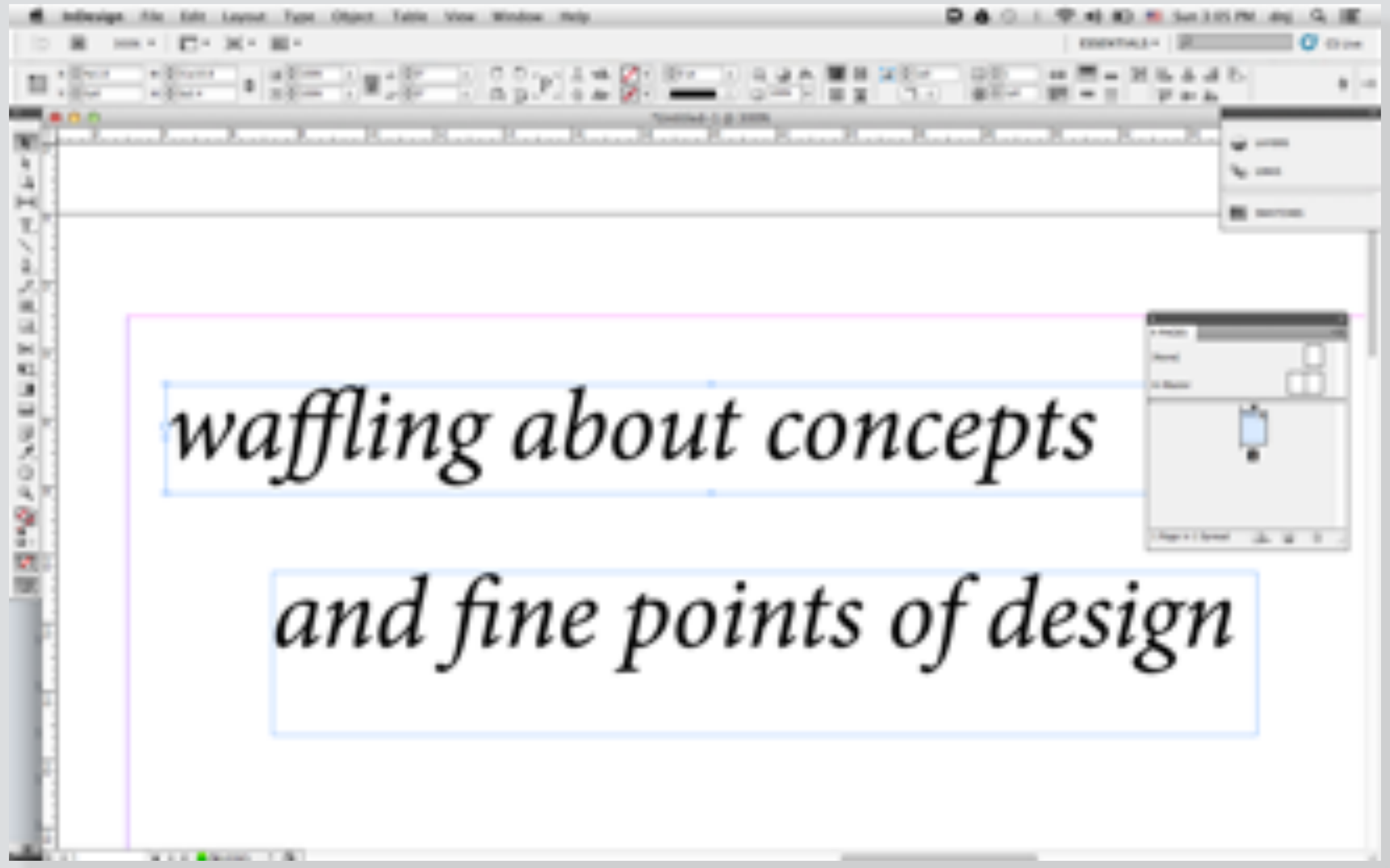
- dependence
concepts have dependences based on functional subsets
what's the point of this?

- criteria: compelling, coherent, controllable (de-coupled), general (complete, consistent),
```

text editor



word processor

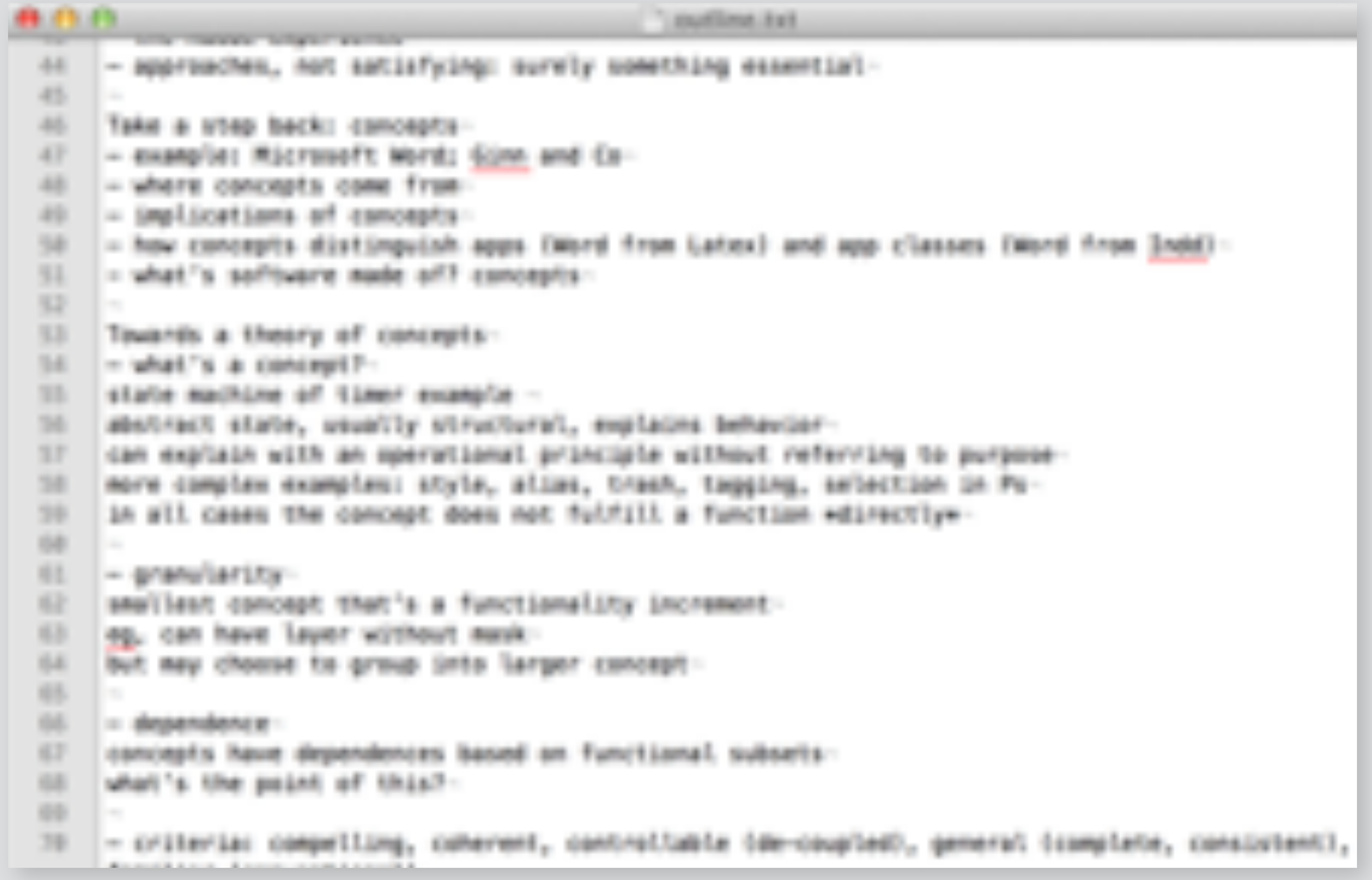


waffling about concepts

and fine points of design

desktop publishing app

characterize apps & families



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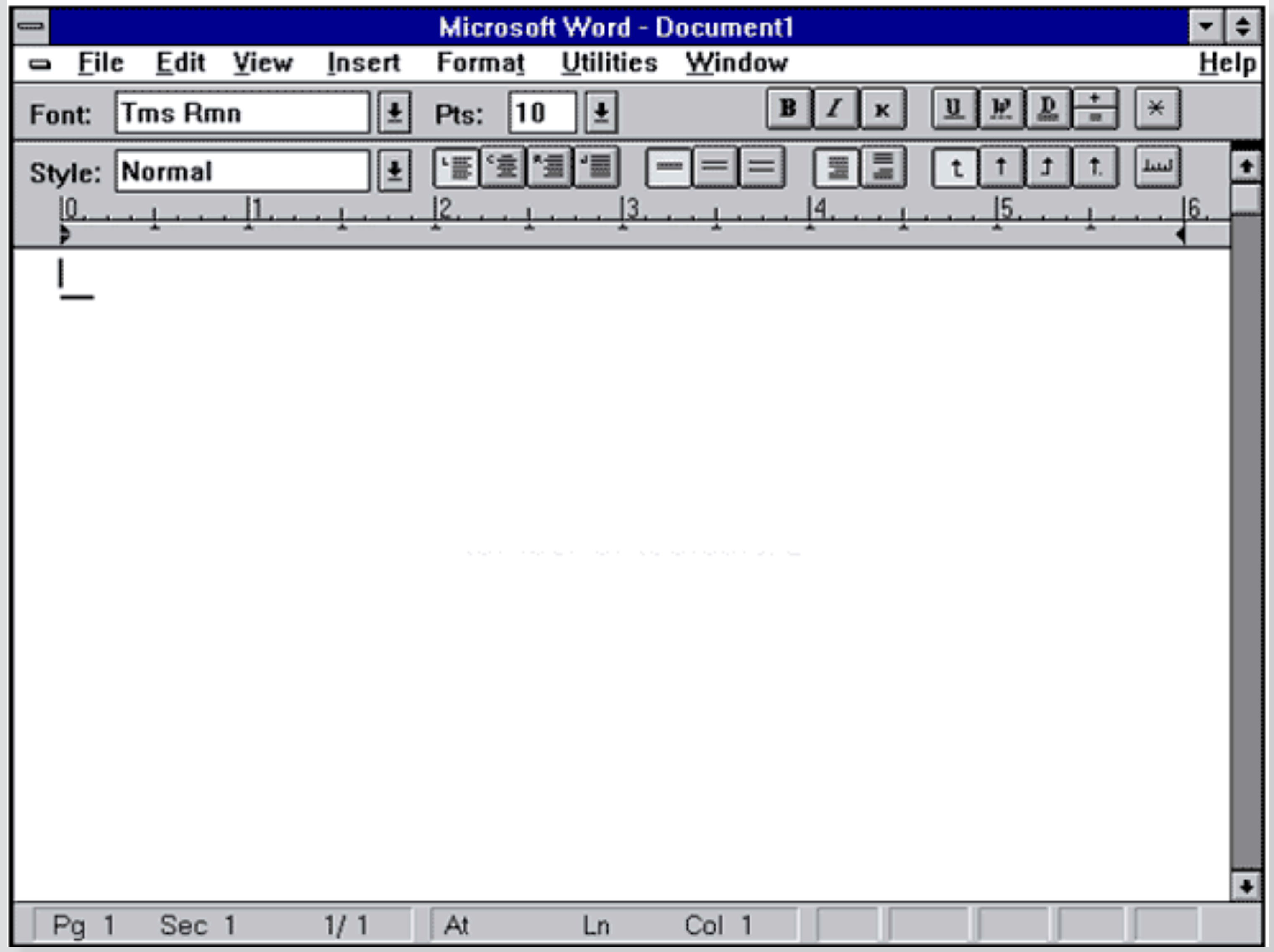
text editor

line

character set

markup



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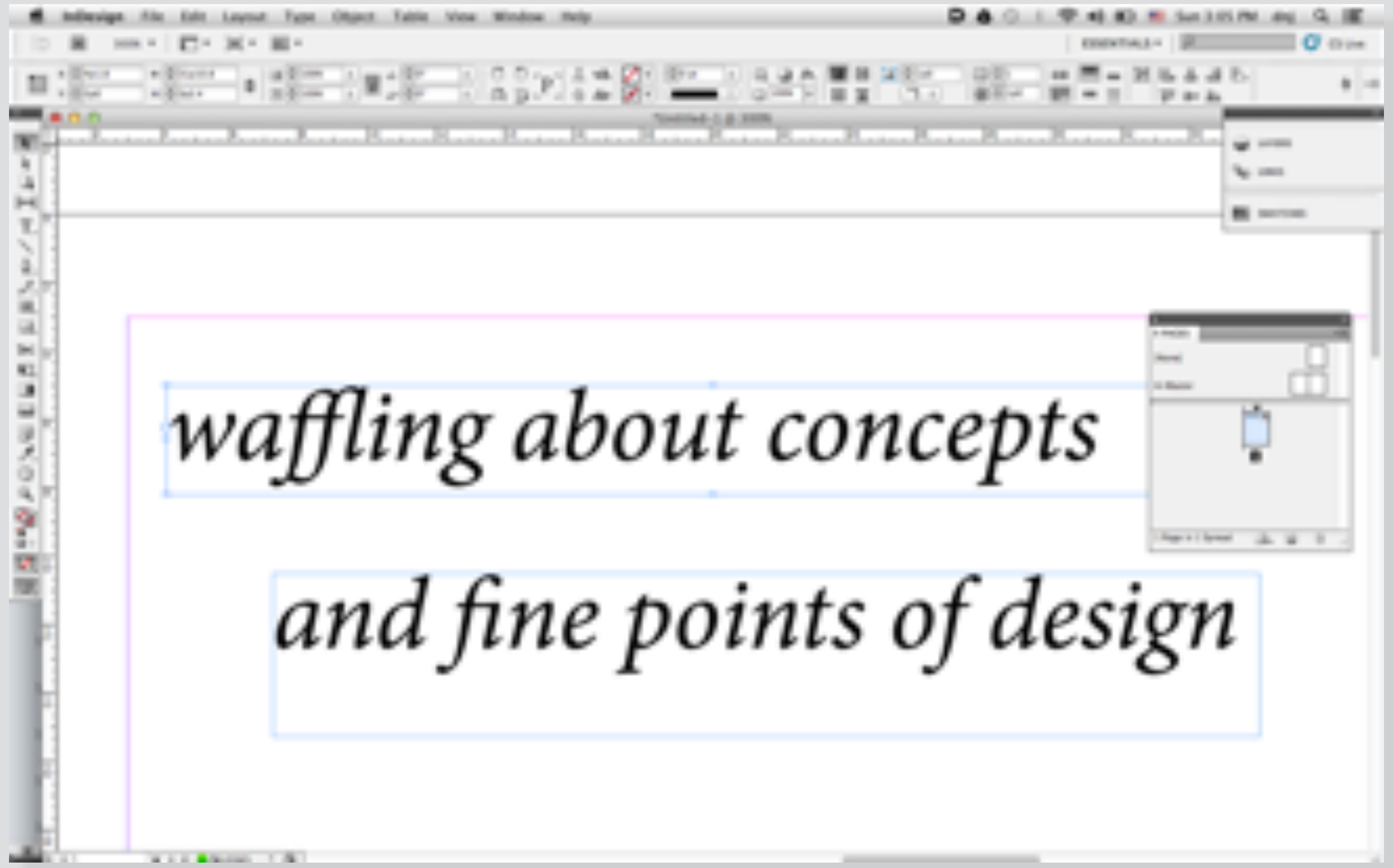
Style: Normal

word processor



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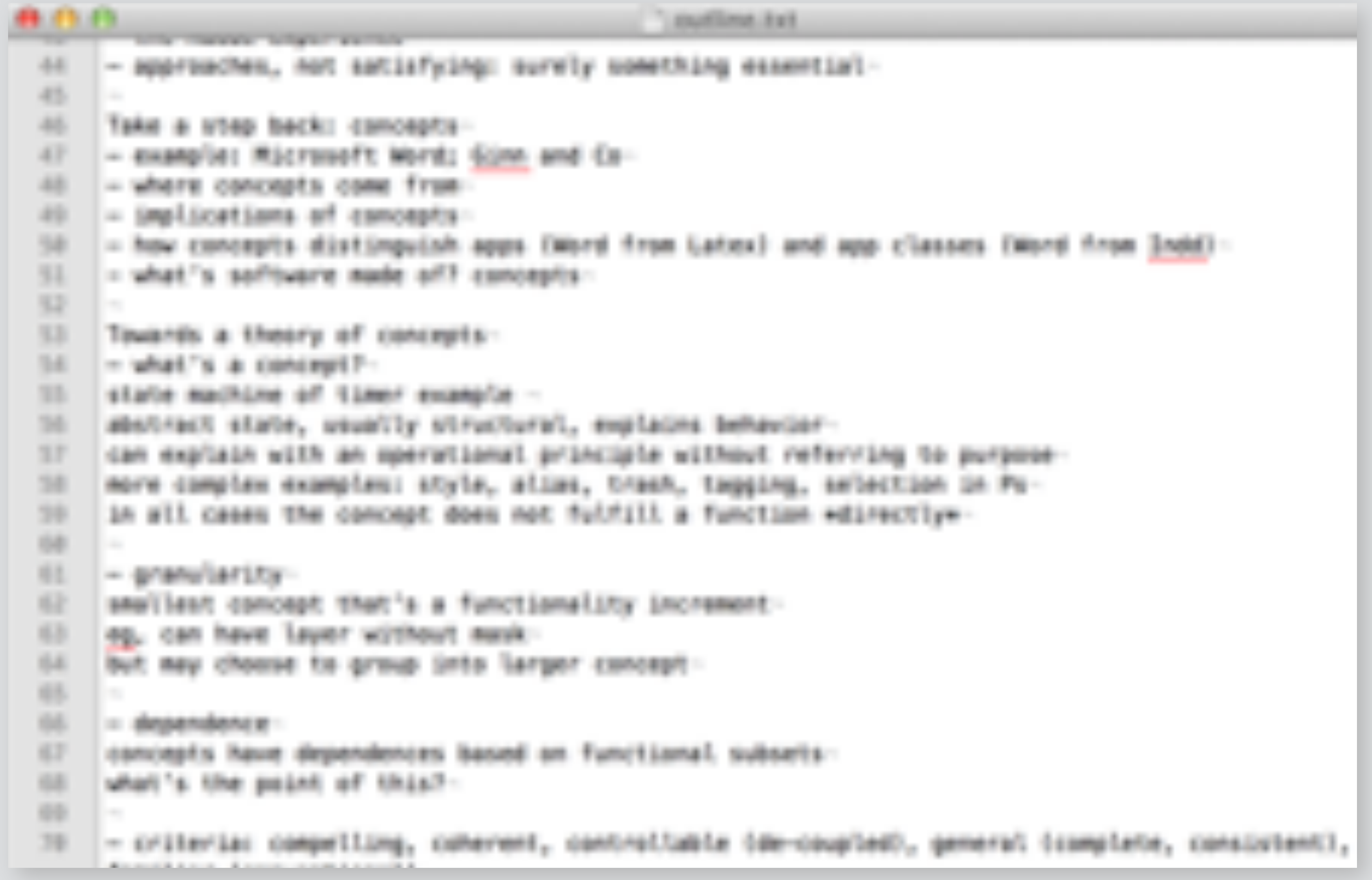

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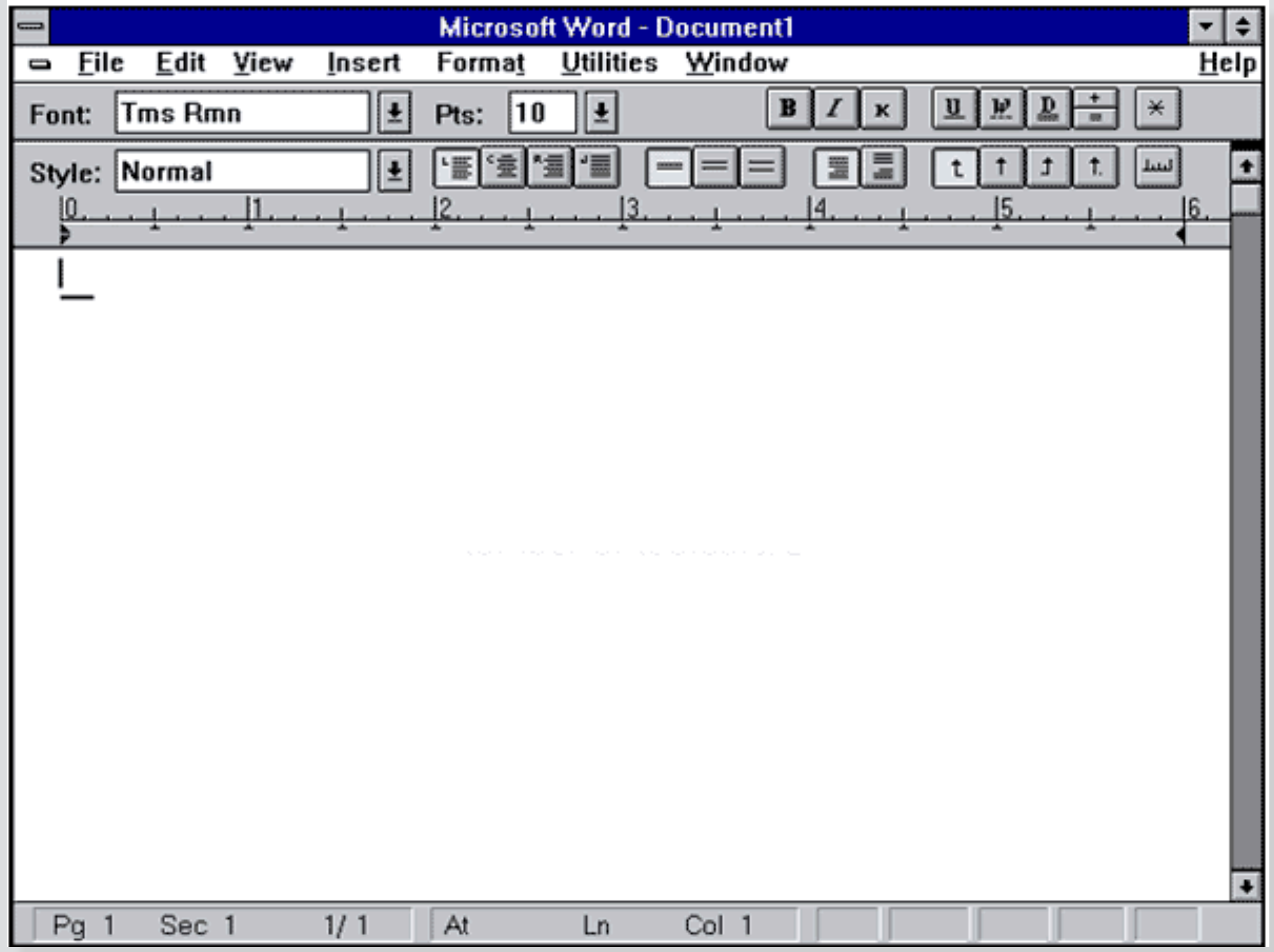


Font: Tms Rmn Pts: 10

Style: Normal

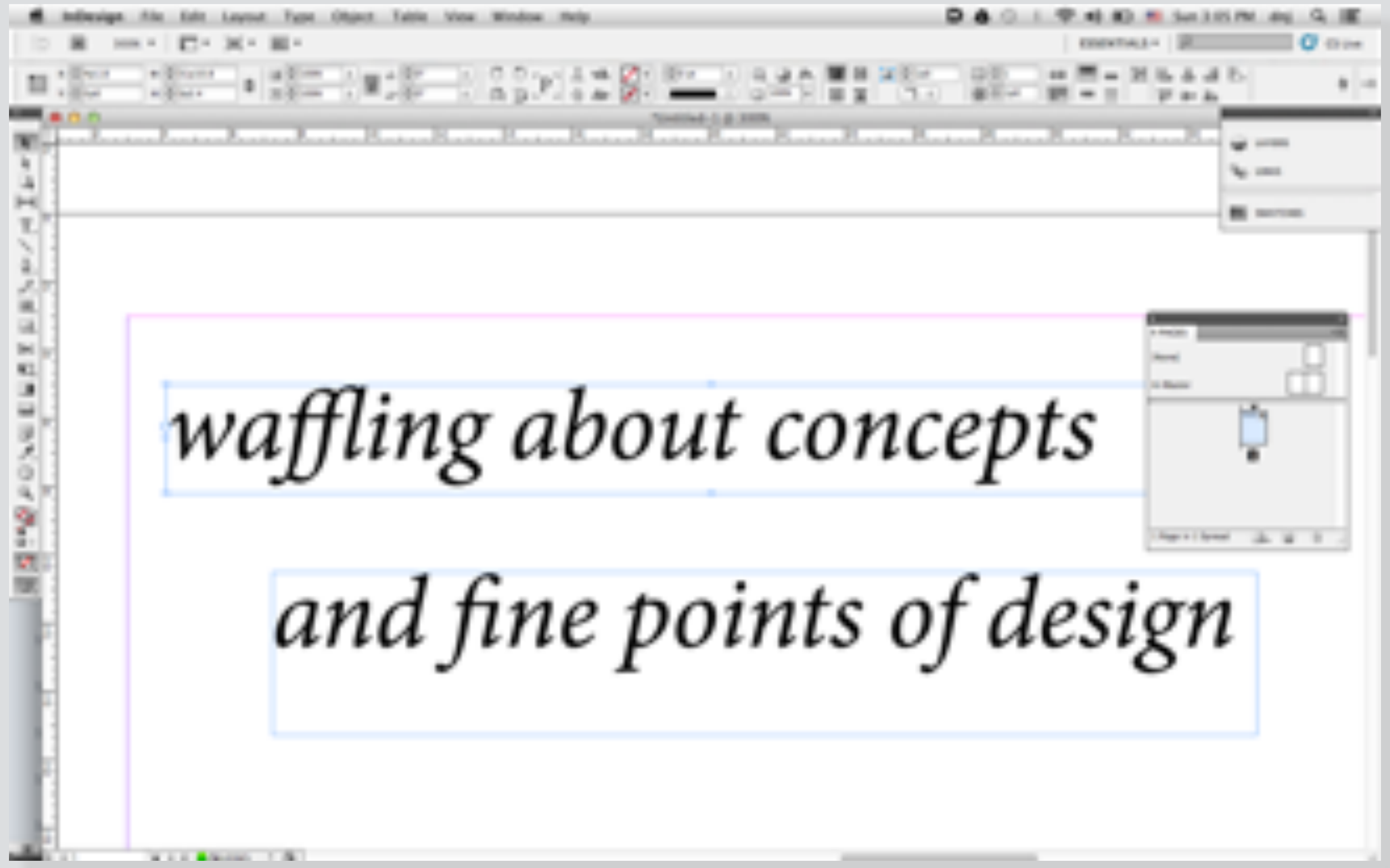
Pg 1 Sec 1 1/ 1 At Ln Col 1

word processor

paragraph

format

style



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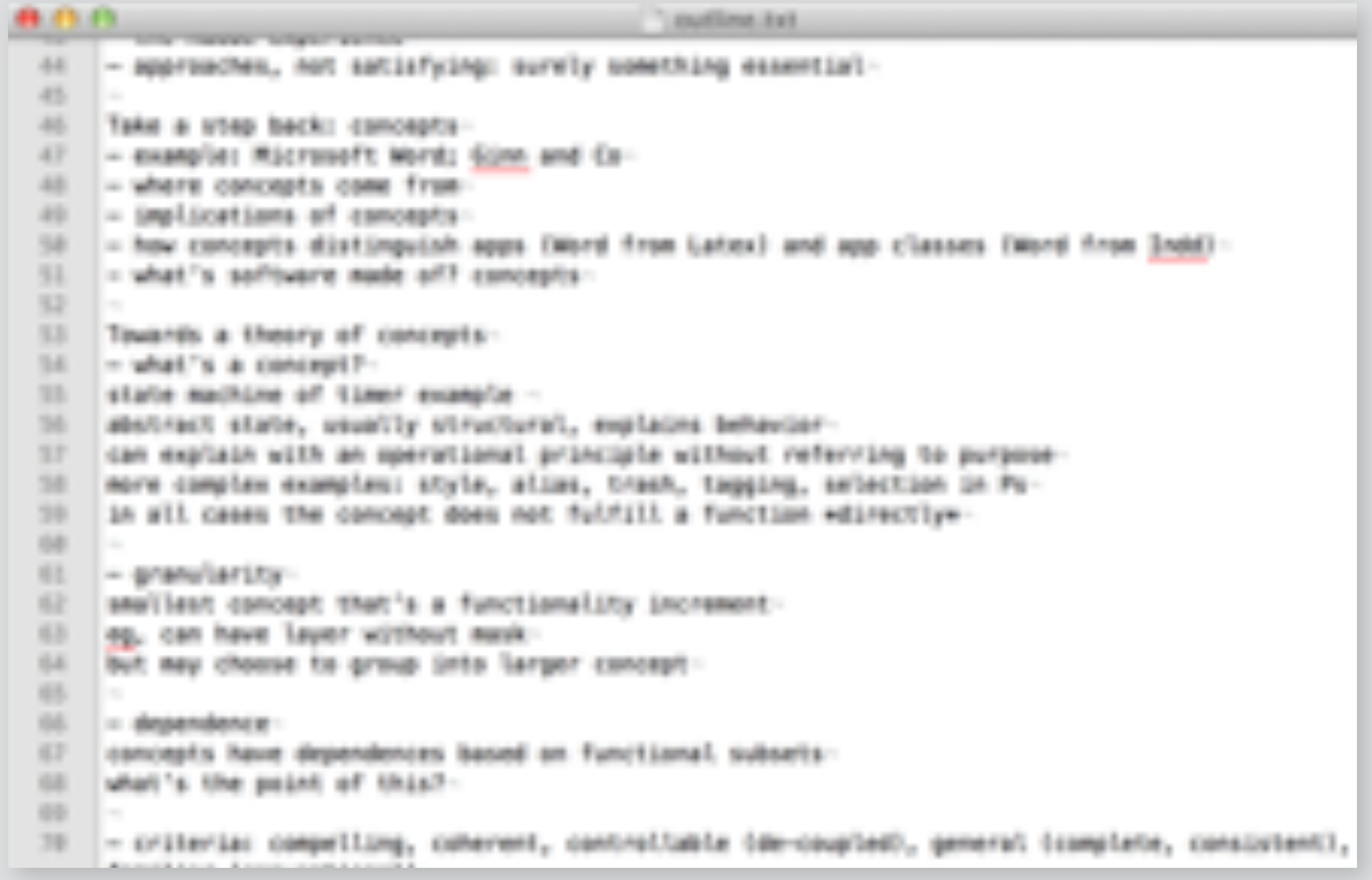

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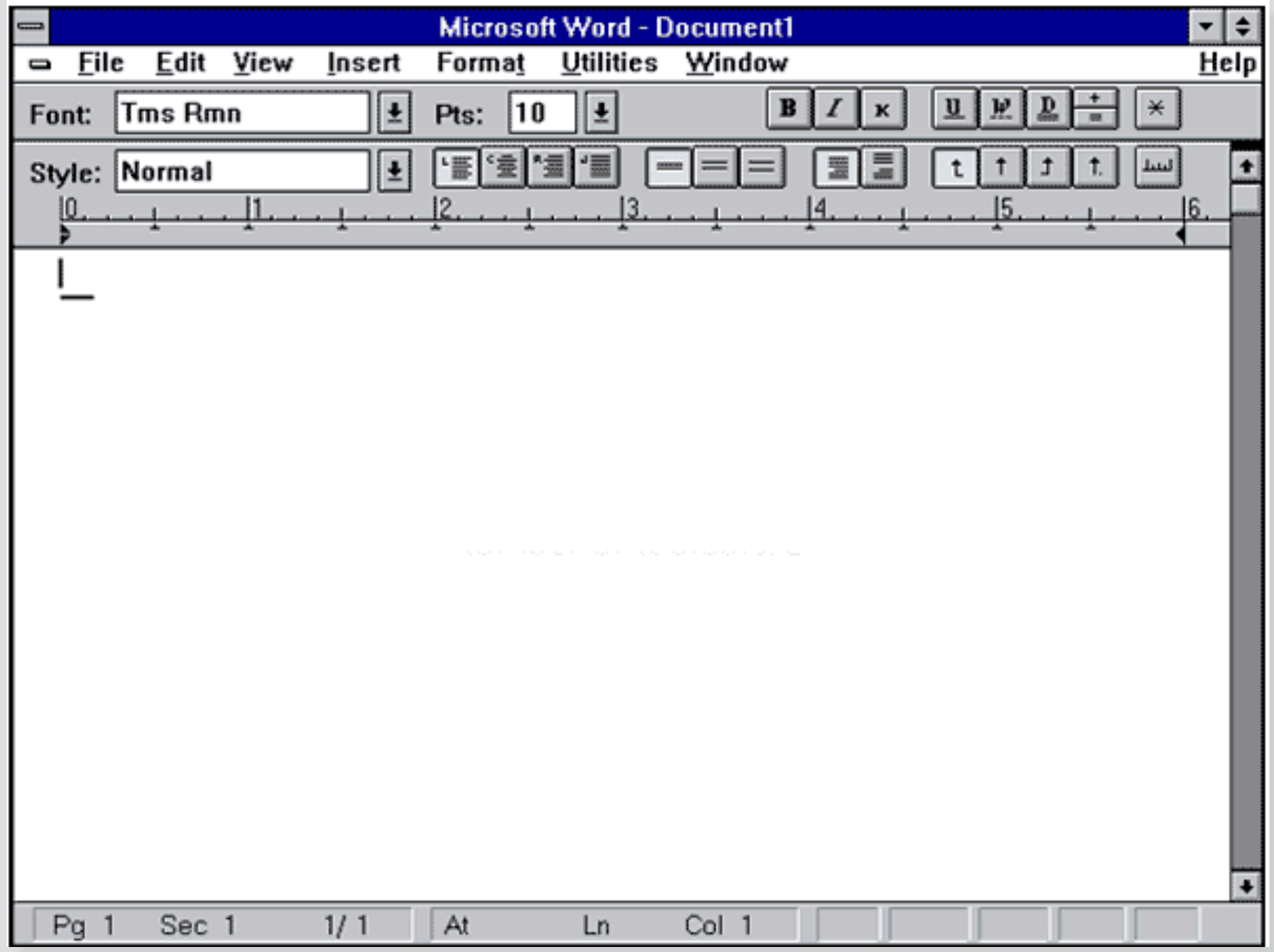

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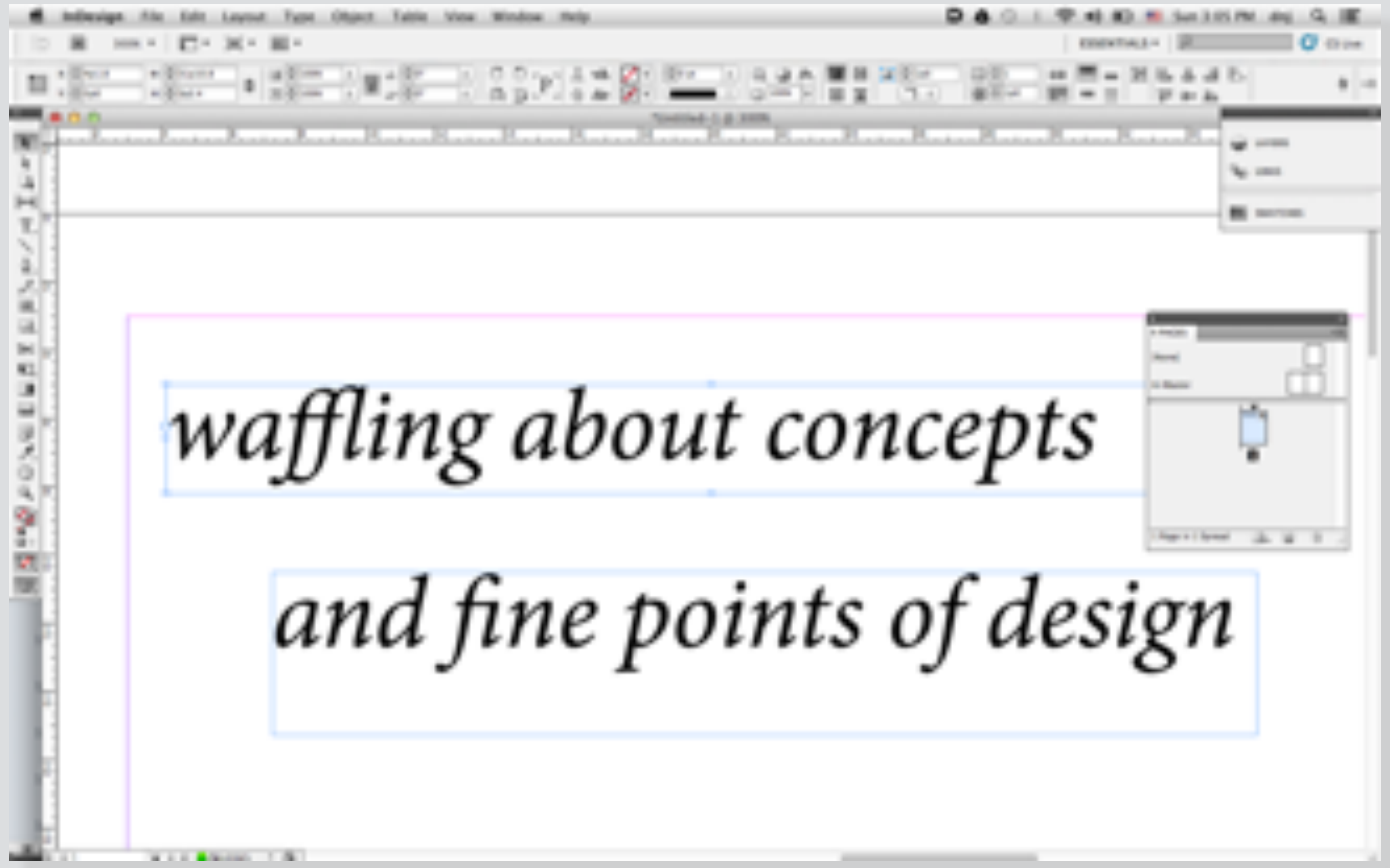

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page

textflow

explore & evaluate individual concepts

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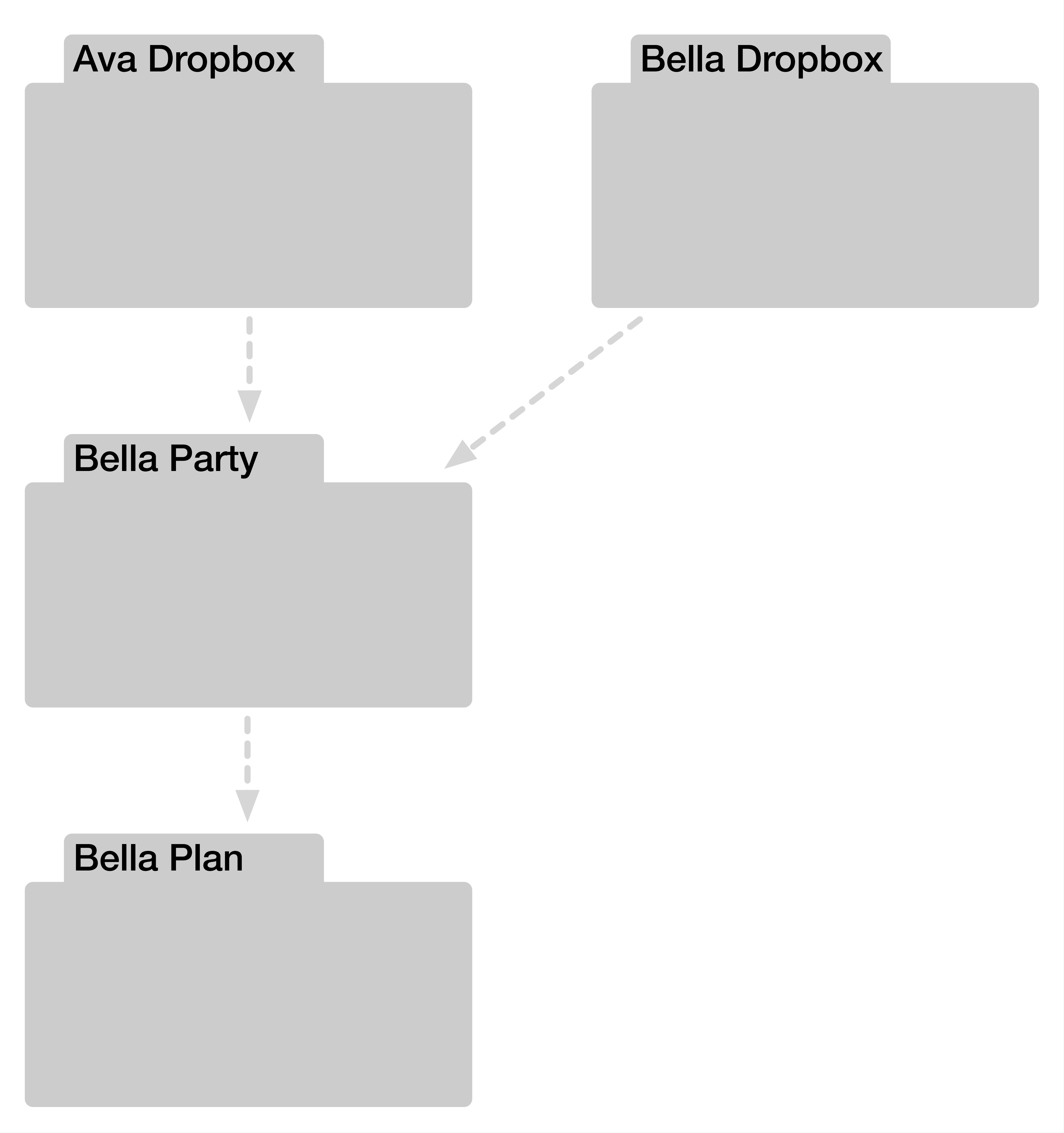
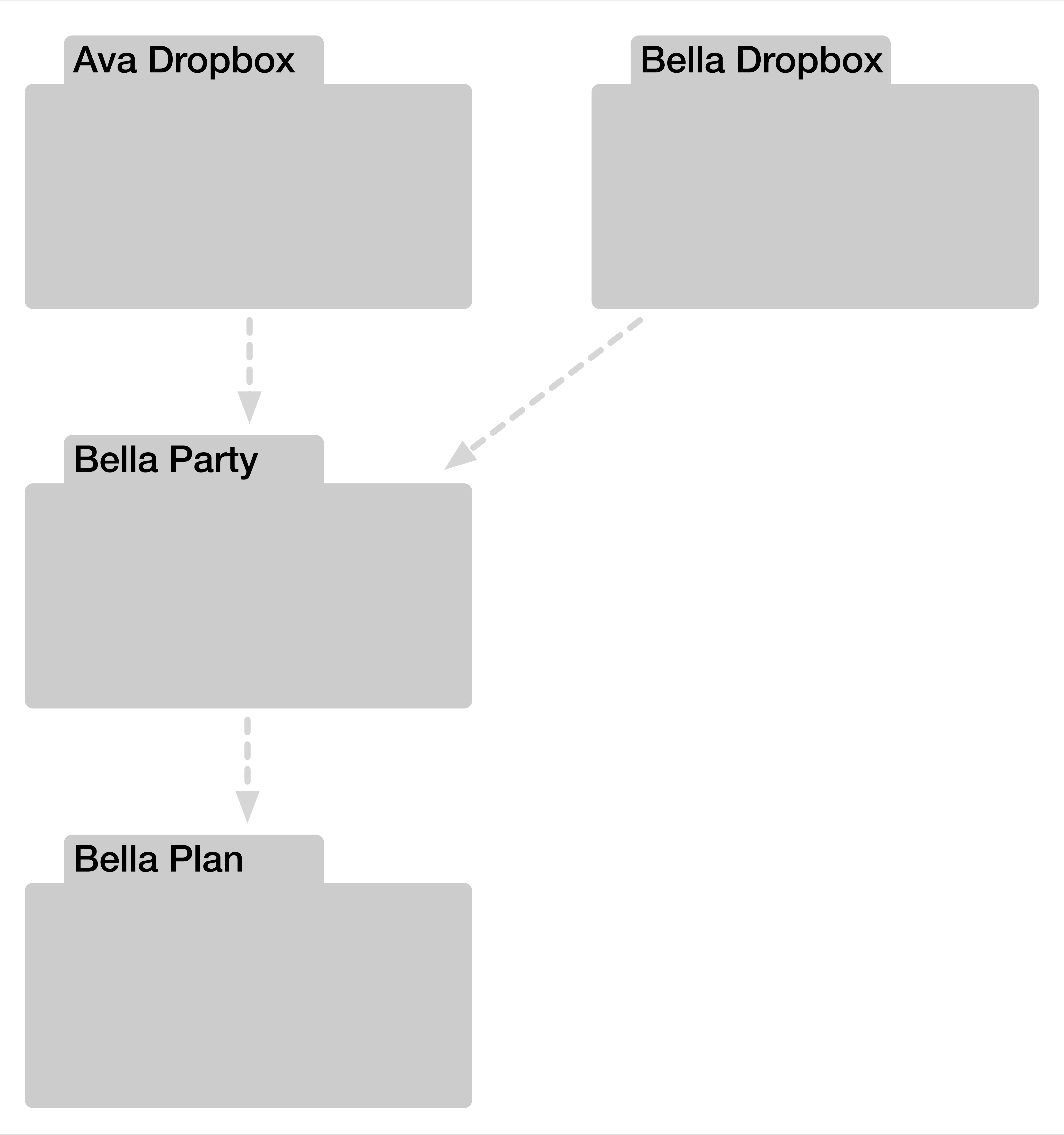


how many users believe the folder concept works

explore & evaluate individual concepts



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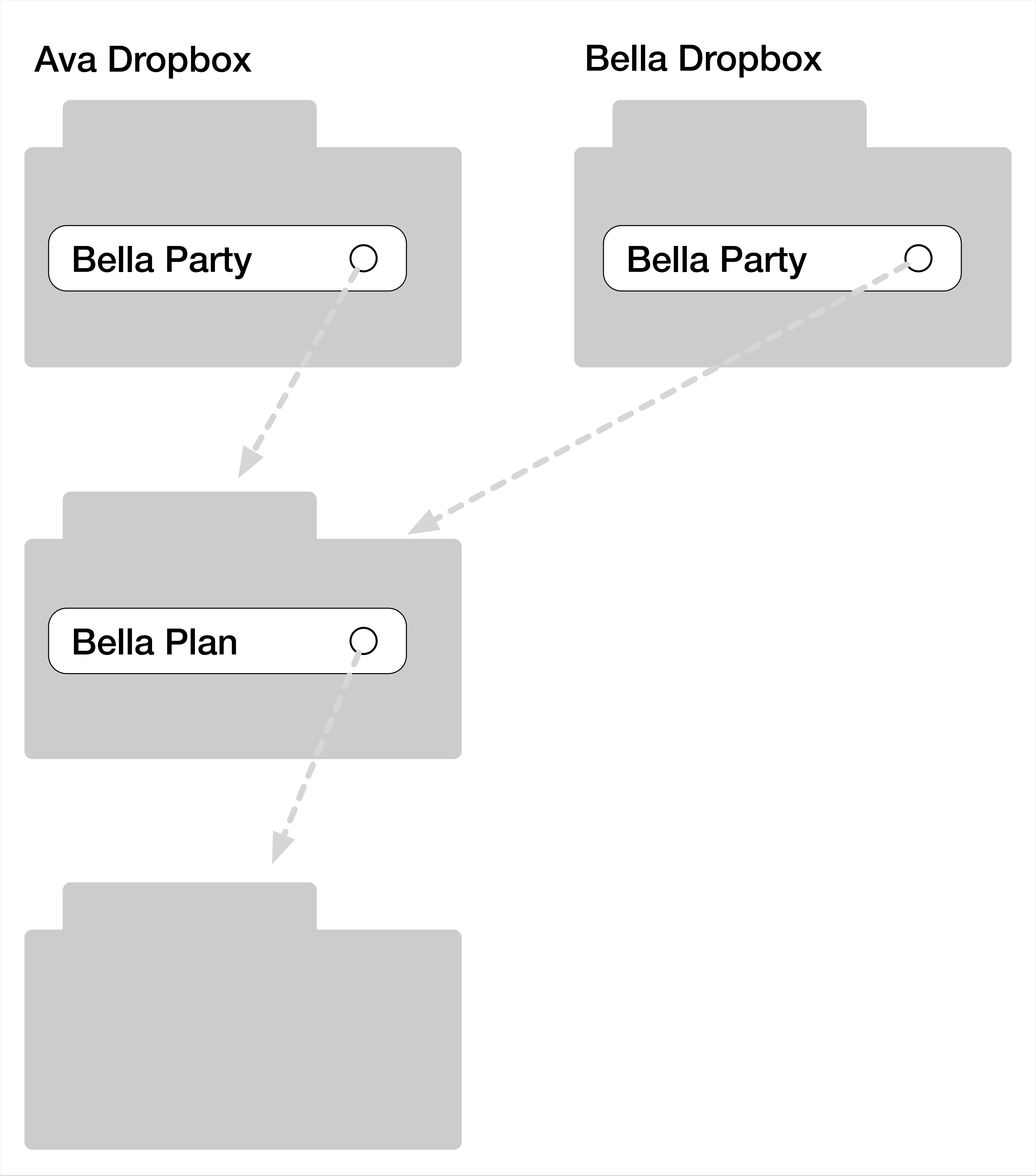
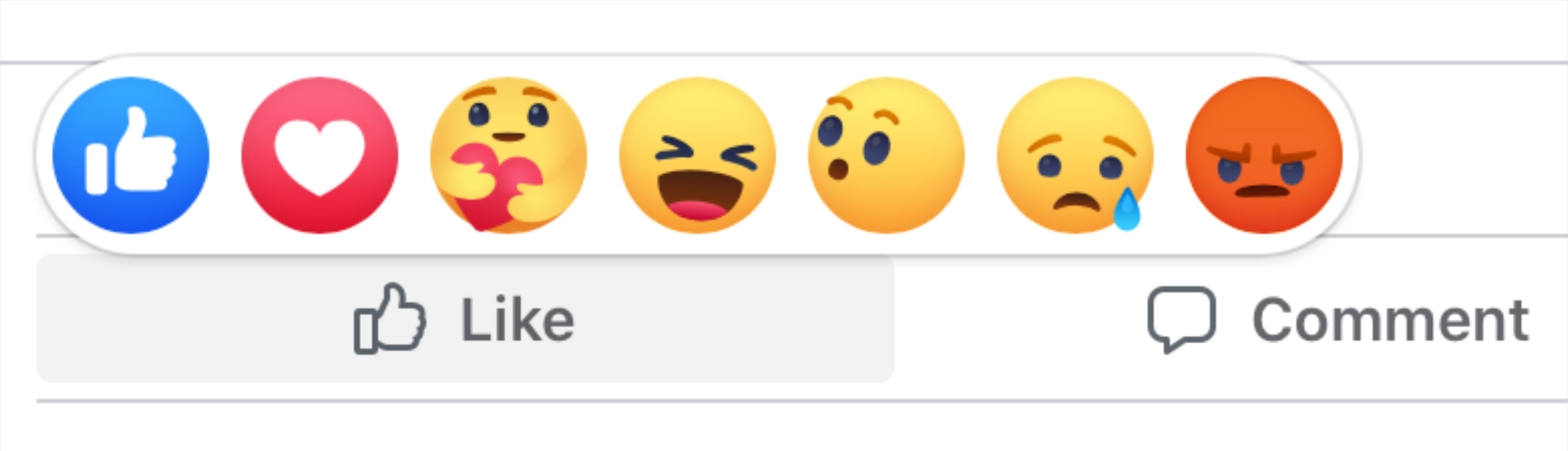


how folders actually work (in Dropbox, Unix, Multics)

analyze how concepts fit together



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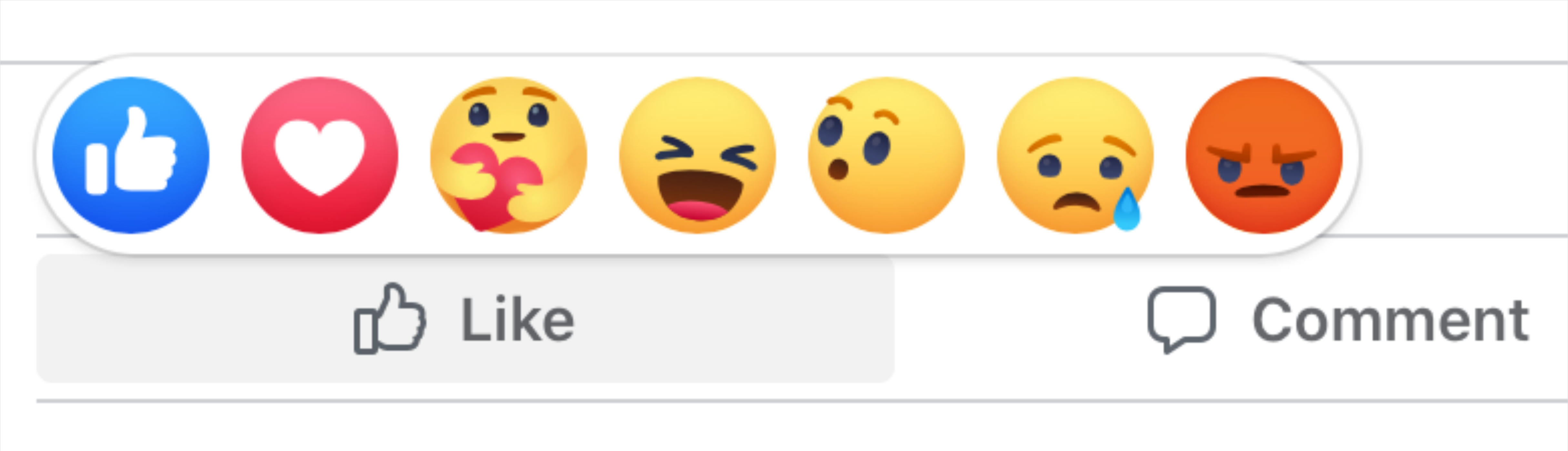


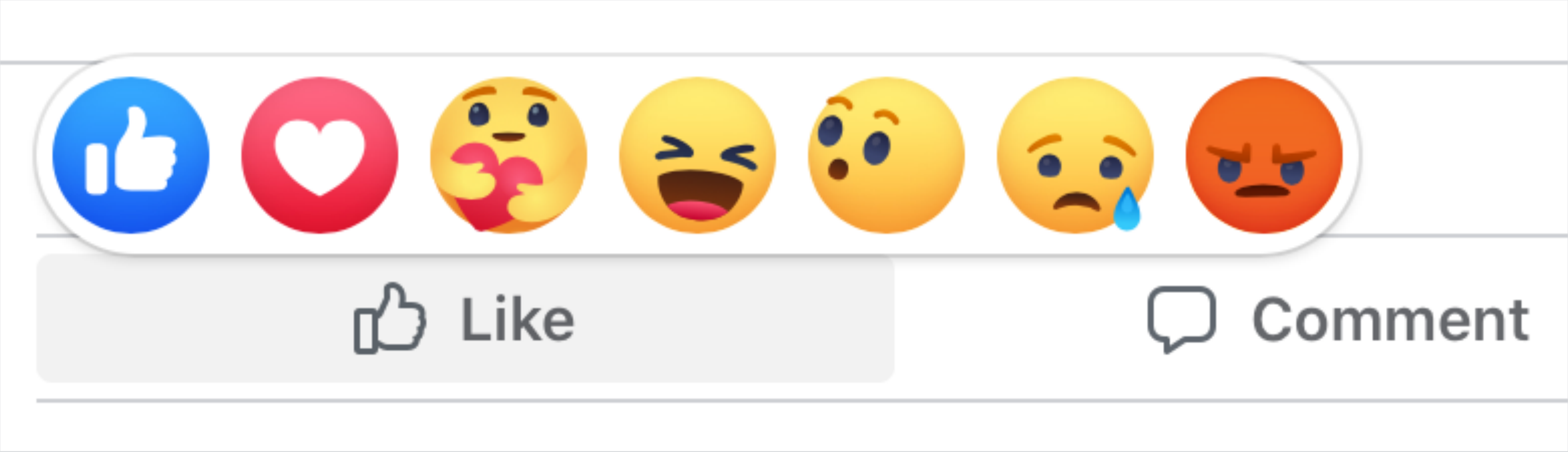
concept Upvote

purpose rank items by popularity

actions

```
  upvote (u: User, i: Item)
   ...
```

analyze how concepts fit together



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purpose convey emotion to author

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  reactAngry (u: User, i: Item)
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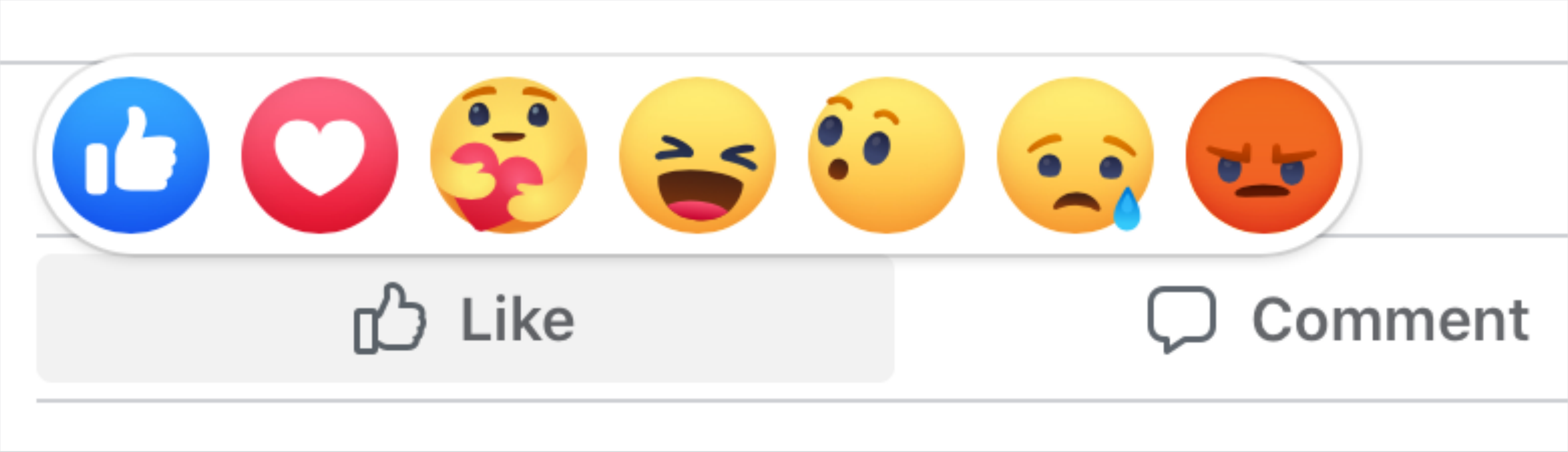

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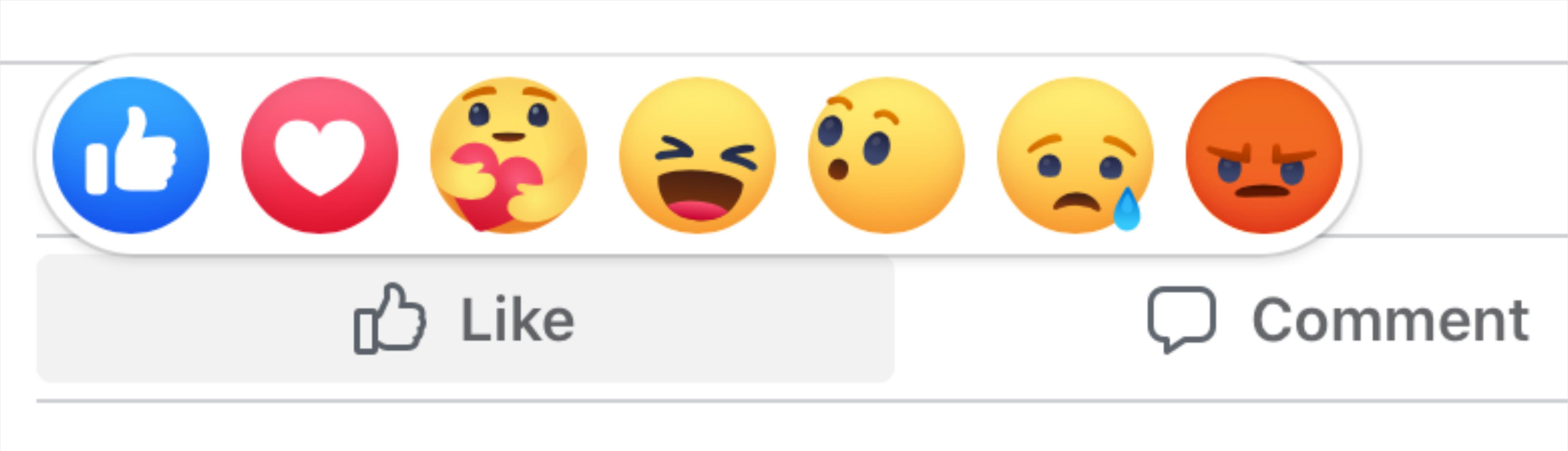

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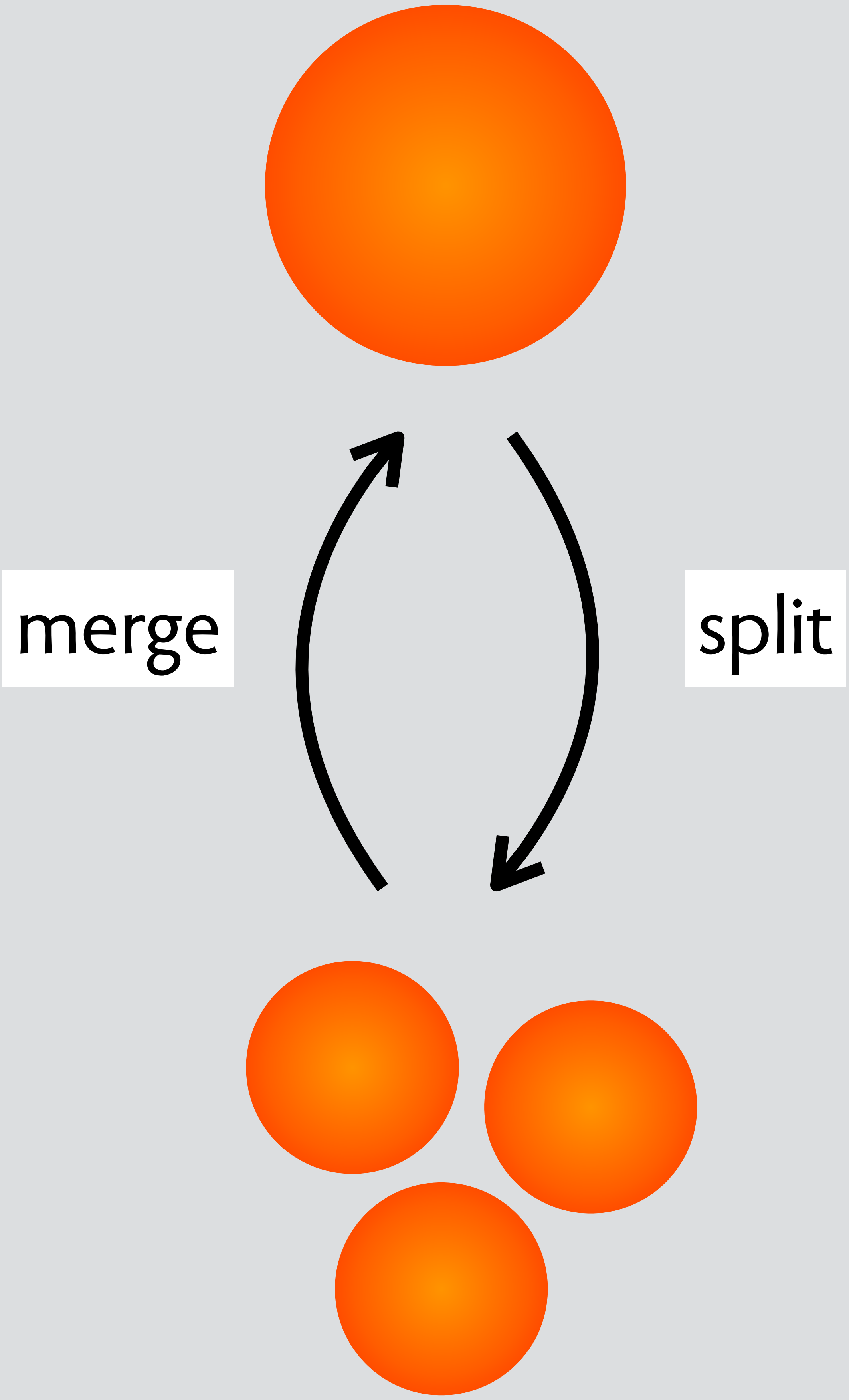
unwanted sync?

design moves

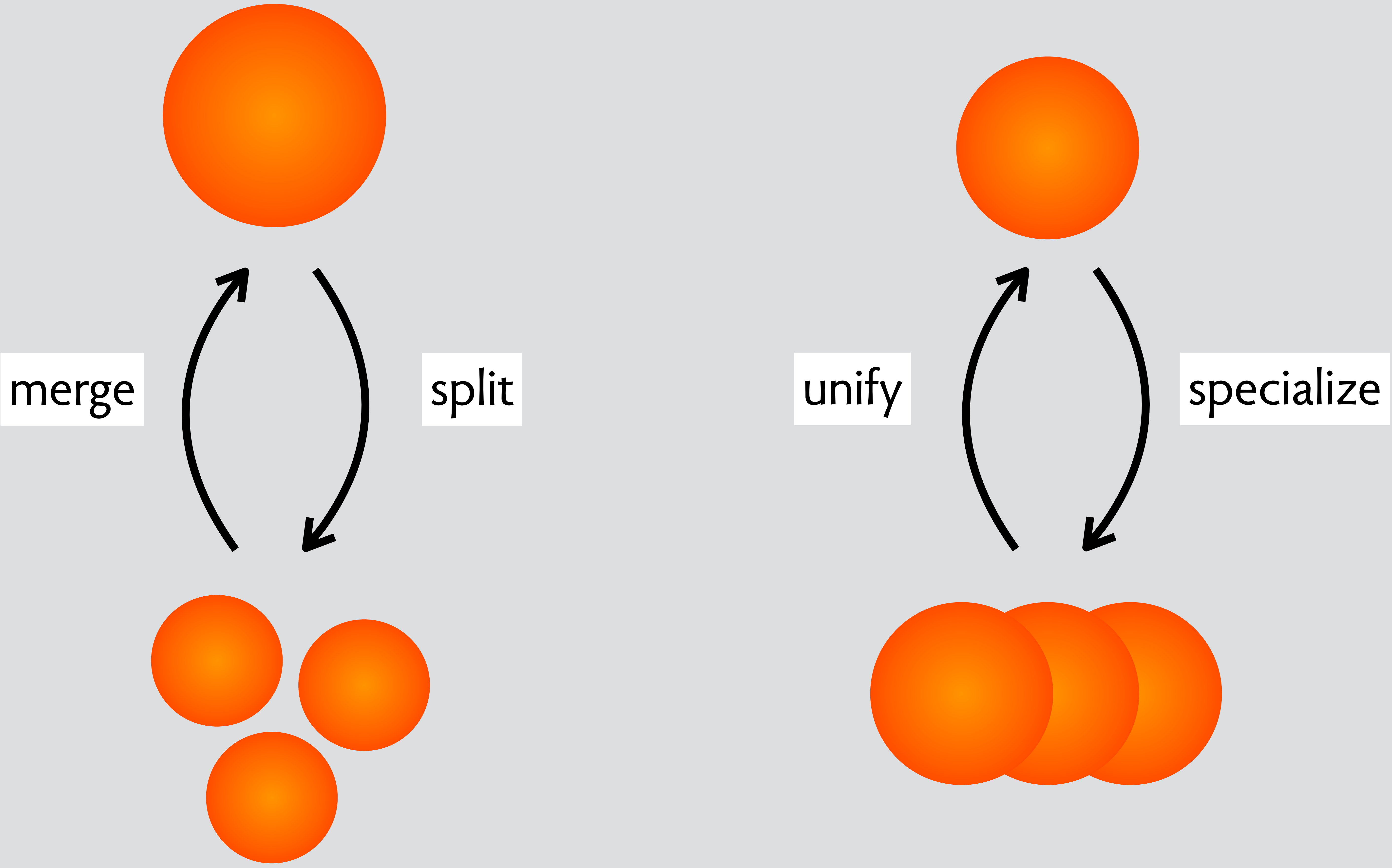
mechanical analogs

three pairs of design moves

three pairs of design moves



three pairs of design moves



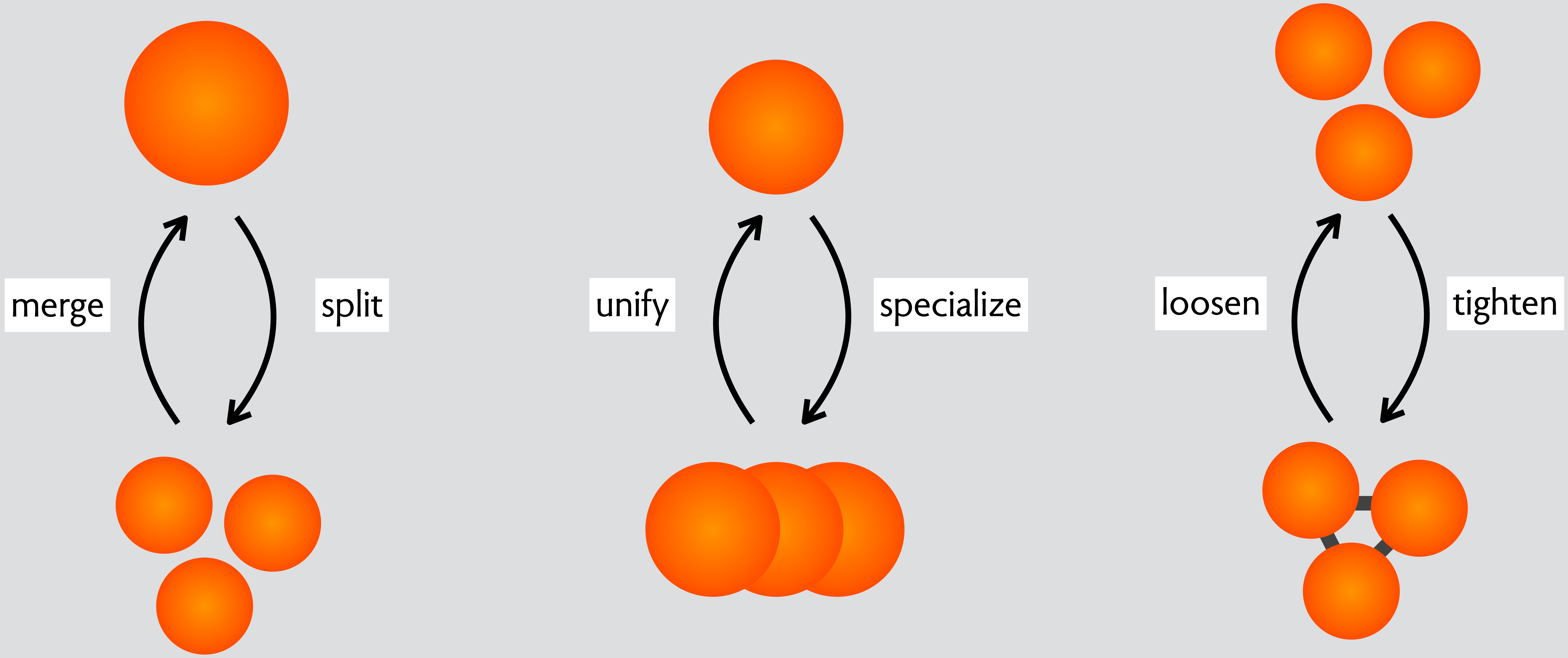
merge

split

unify

specialize

three pairs of design moves



split-merge: tradeoff simplicity/flexibility

split-merge: tradeoff simplicity/flexibility

photocopier

split

printer + scanner

split-merge: tradeoff simplicity/flexibility

photocopier

split

printer + scanner

emergency flashlight

merge

flashlight + battery + charger

unify-specialize: tradeoff simplicity/specificity

unify-specialize: tradeoff simplicity/specificity

set of wrenches

unify

adjustable wrench

unify-specialize: tradeoff simplicity/specificity

set of wrenches

unify

adjustable wrench

general-purpose lens

specialize

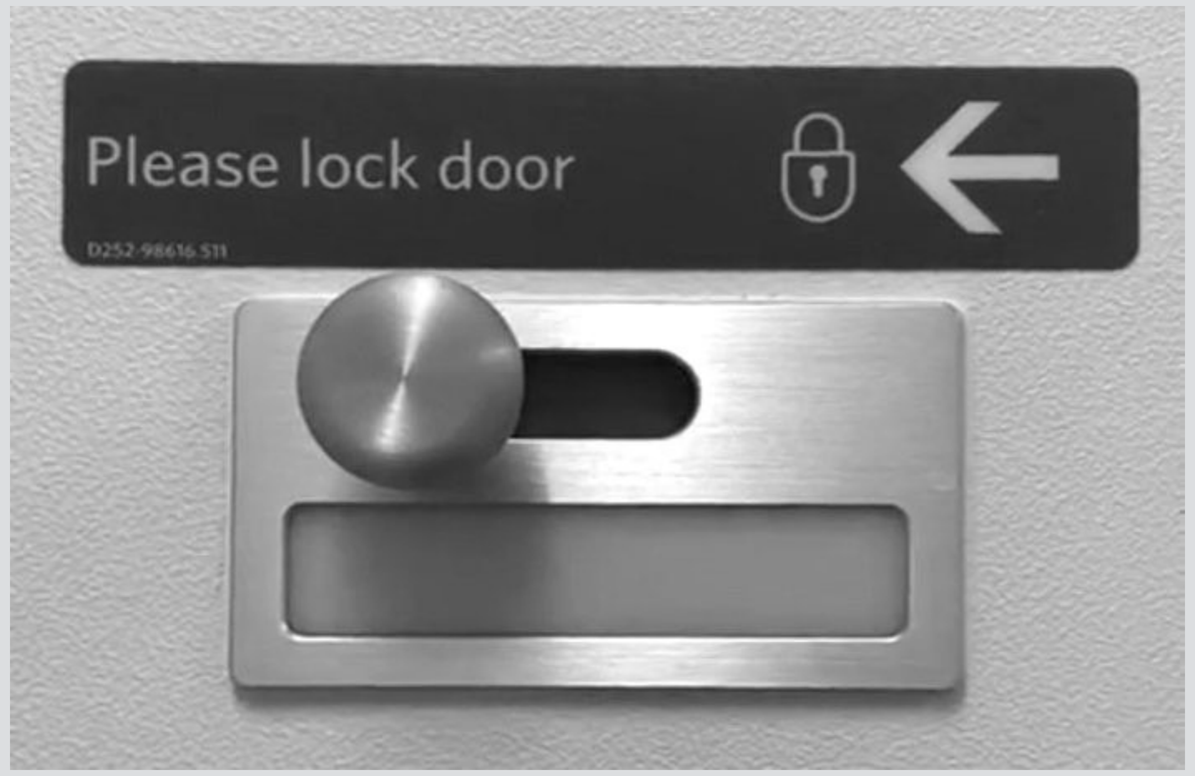
macro lens

tighten-loosen: tradeoff automation/flexibility

tighten-loosen: tradeoff automation/flexibility

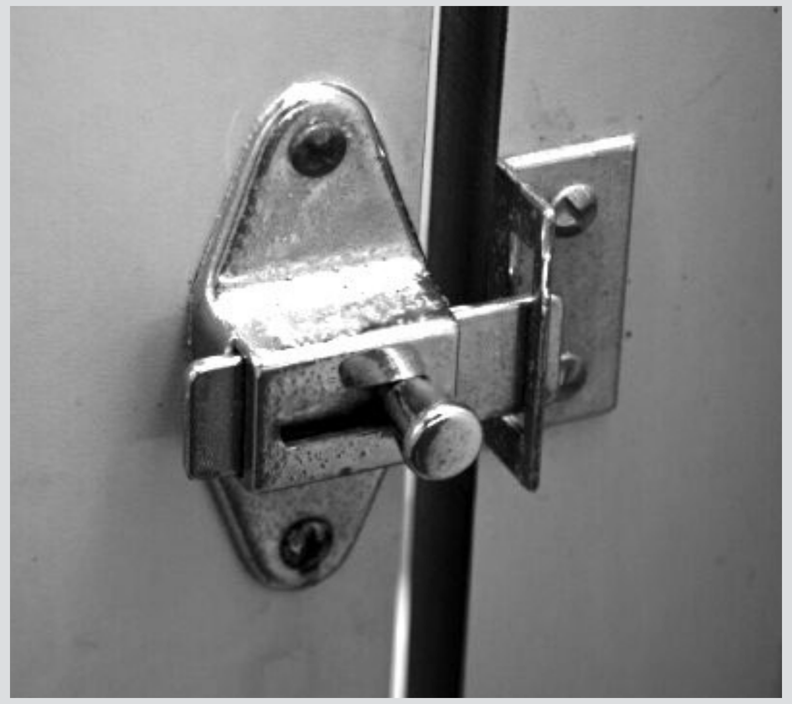
light pull / door lock

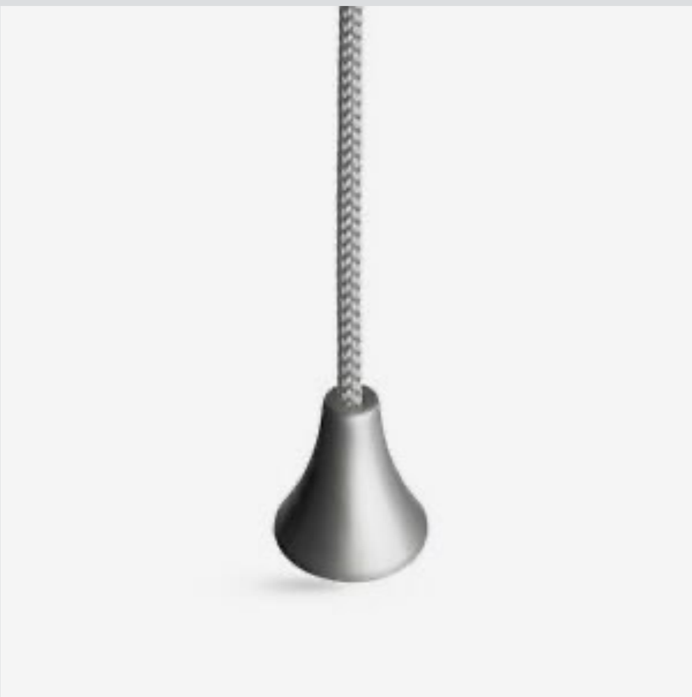
tighten



airplane toilet lock

tighten-loosen: tradeoff automation/flexibility





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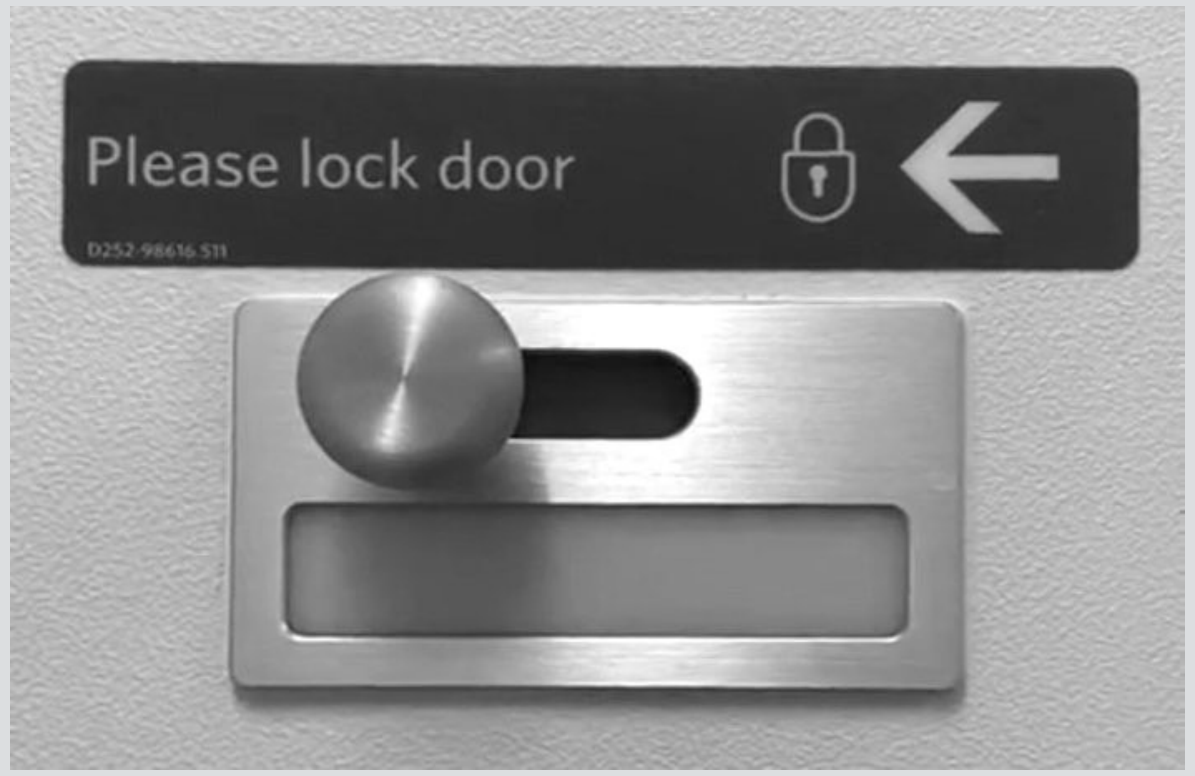
tighten



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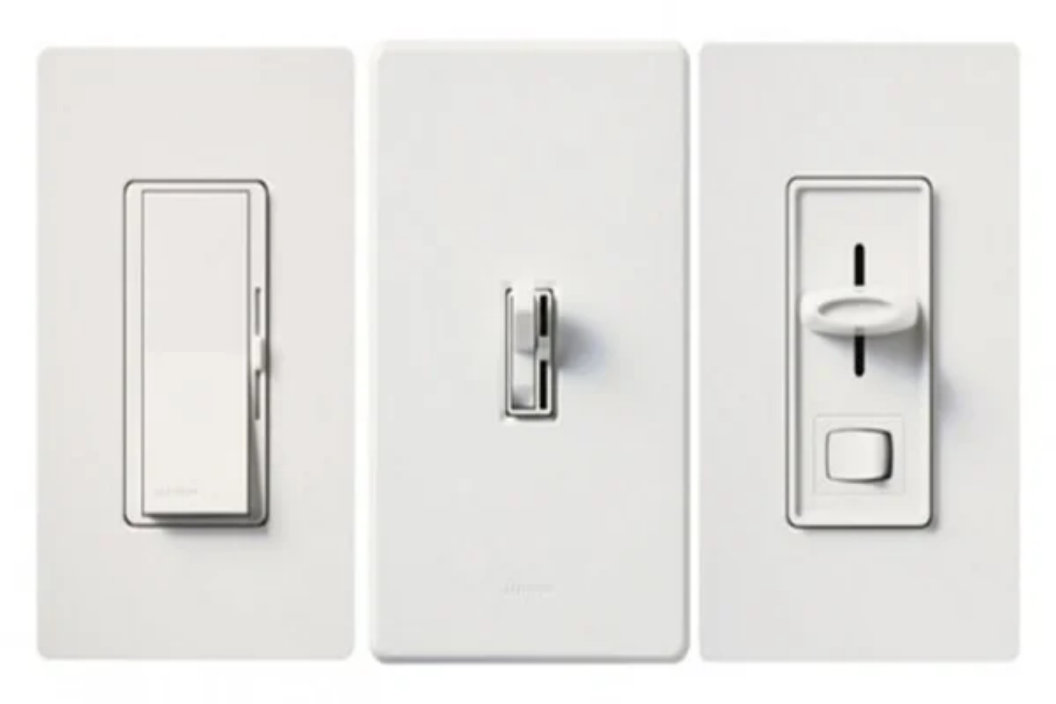
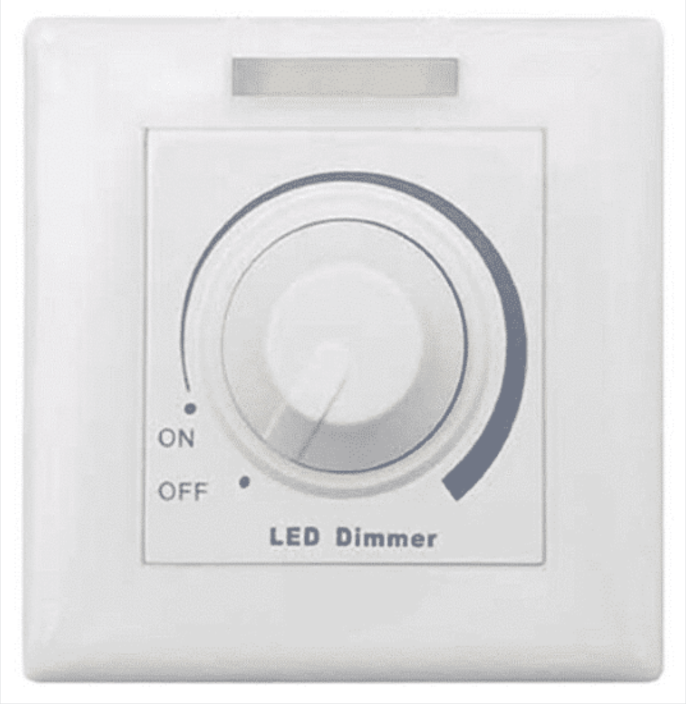


dimmers with separate controls

loosen



rotary dimmer switch

successful
design moves
in software

split: emergence of a concept in Keynote

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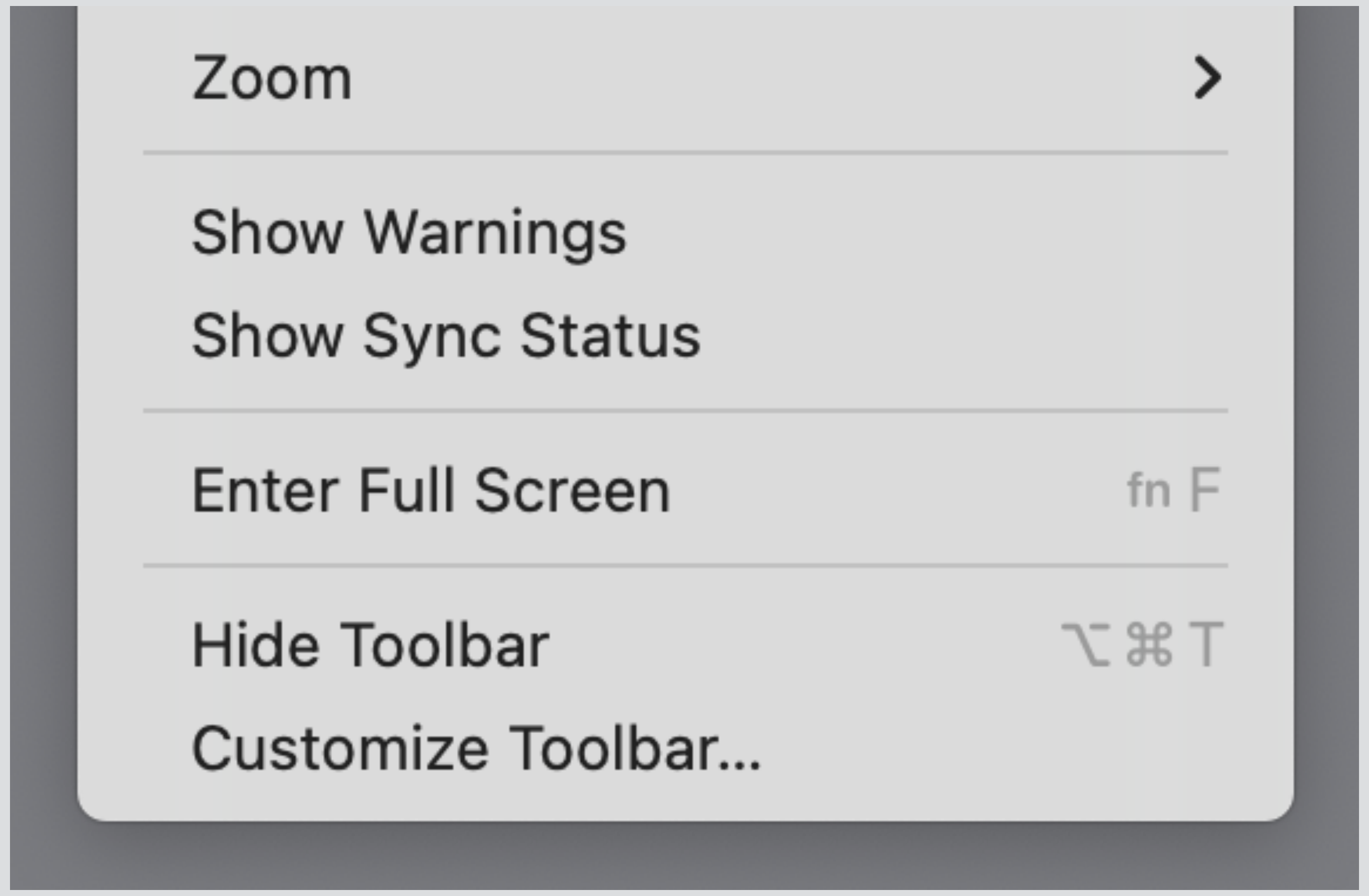
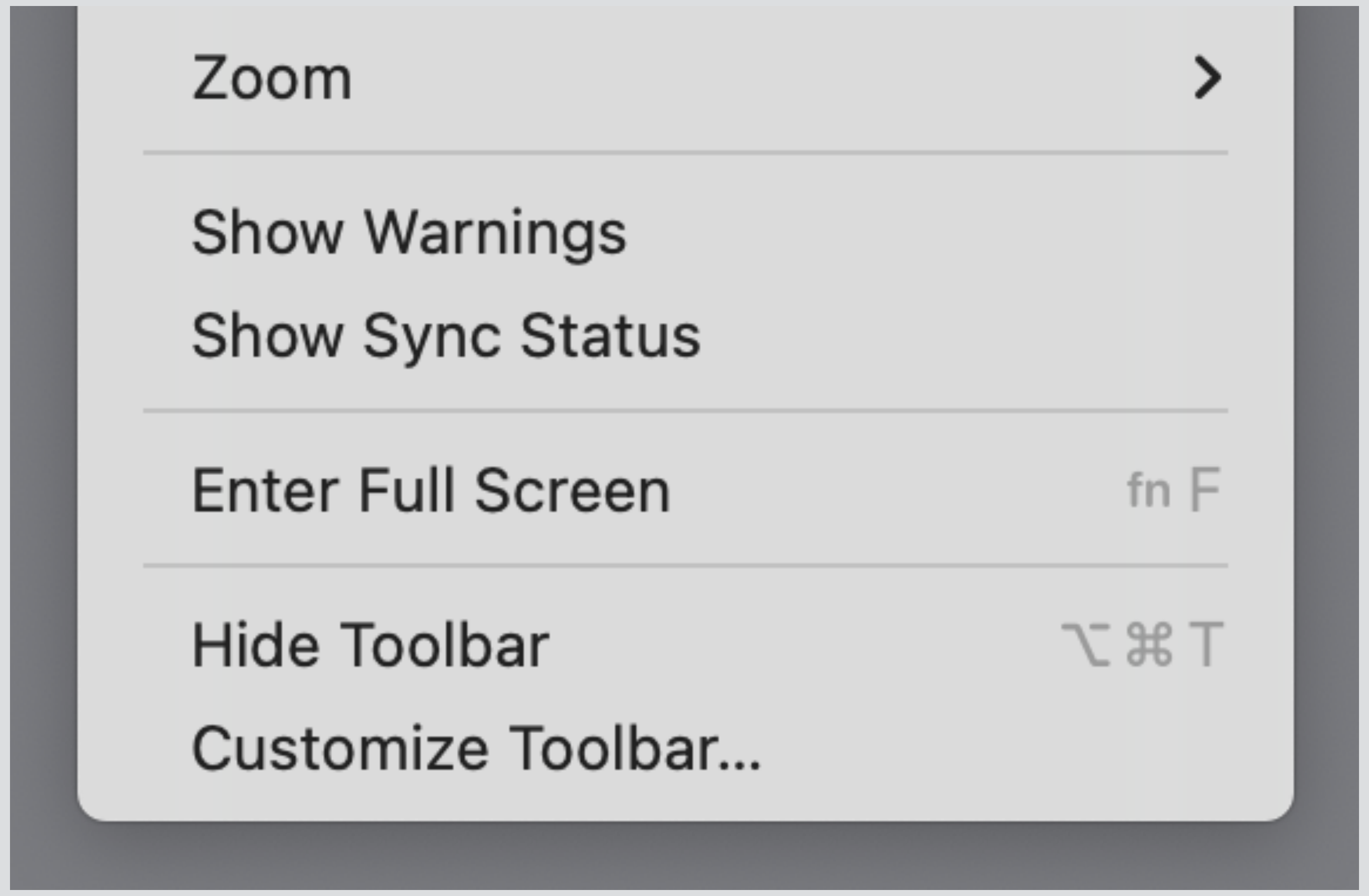


full screen toggle
emerges as partial concept
(c. 2010?)

split: emergence of a concept in Keynote



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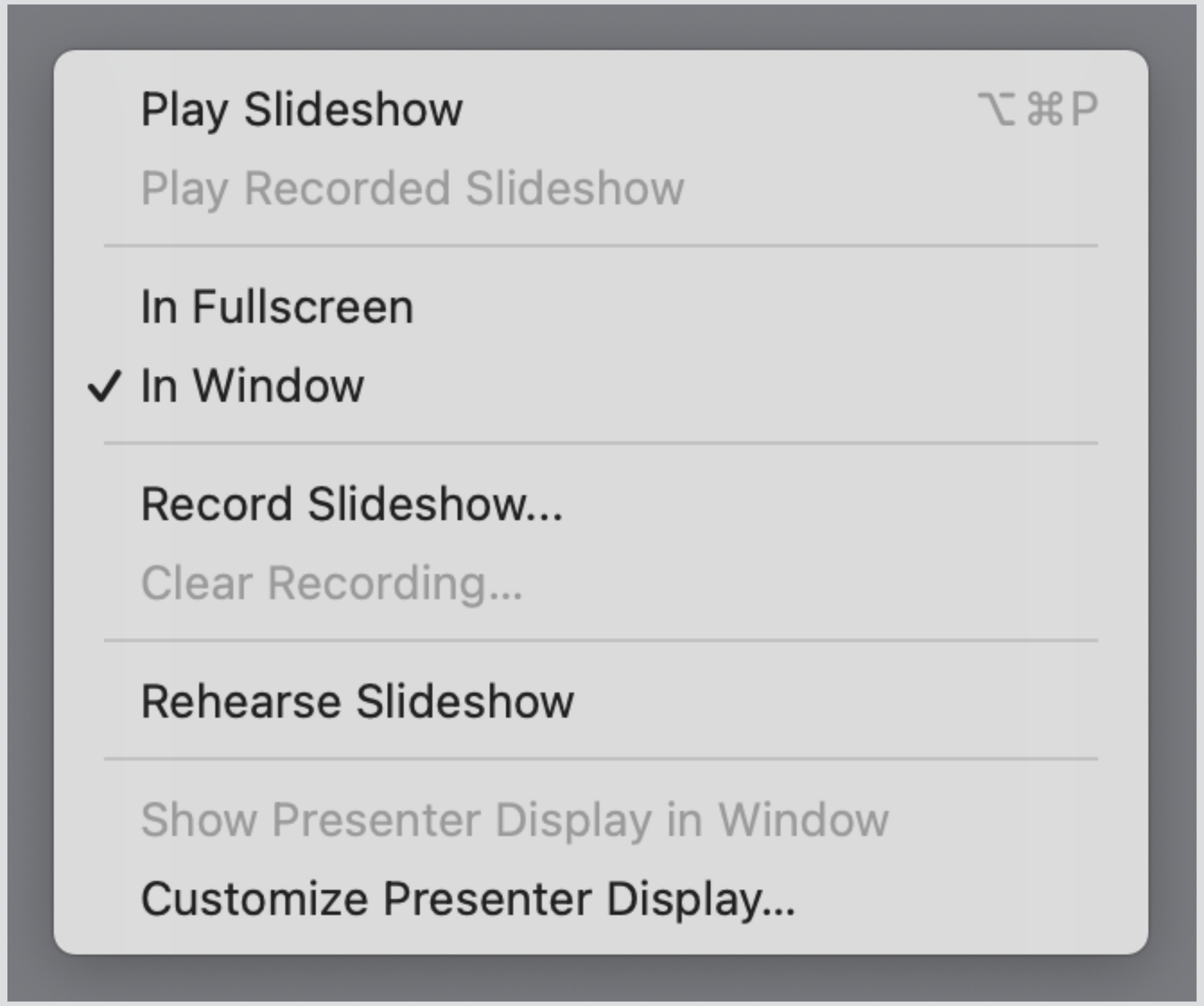

play-in-window option
now an independent concept
(2021)

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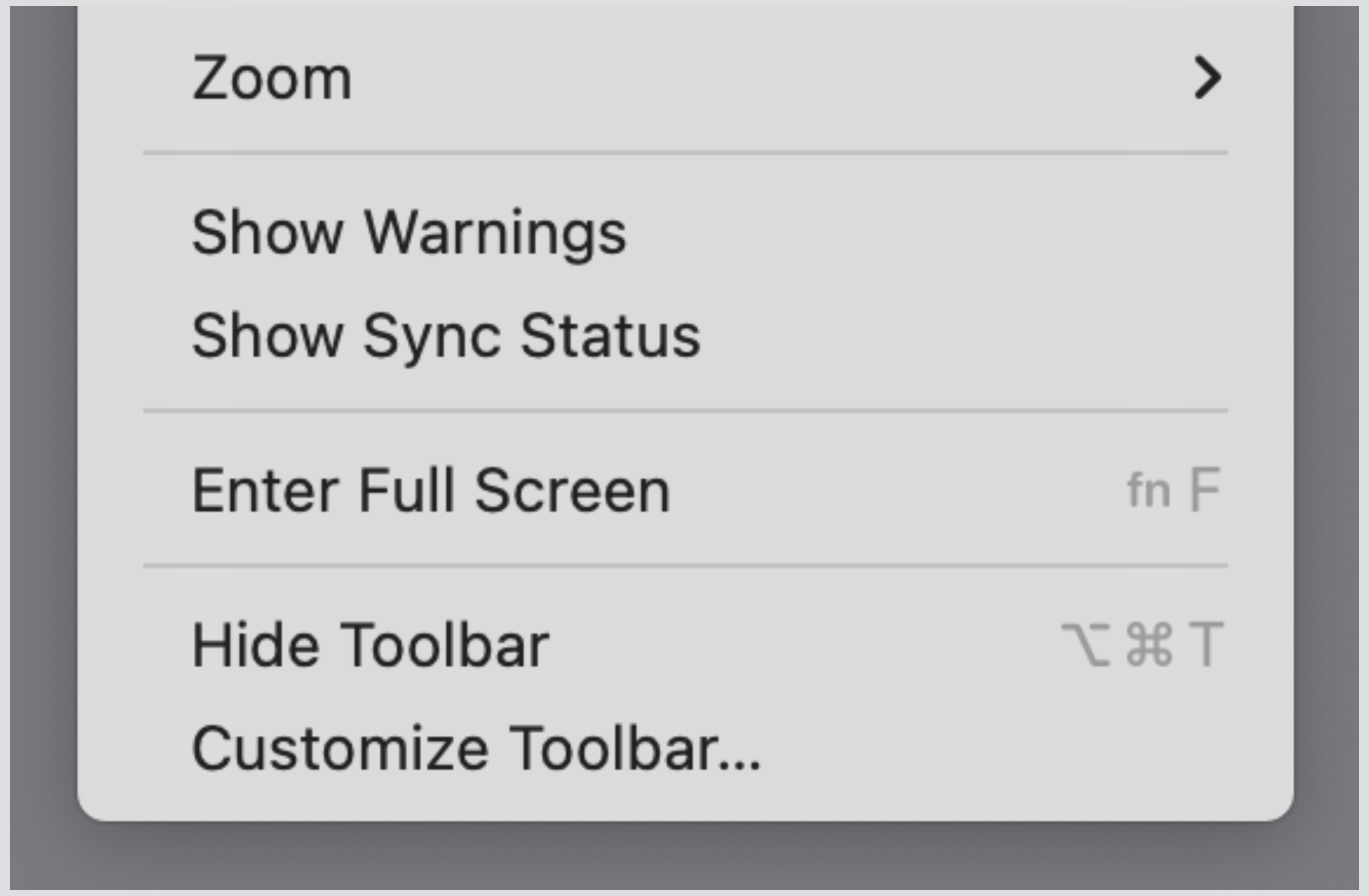

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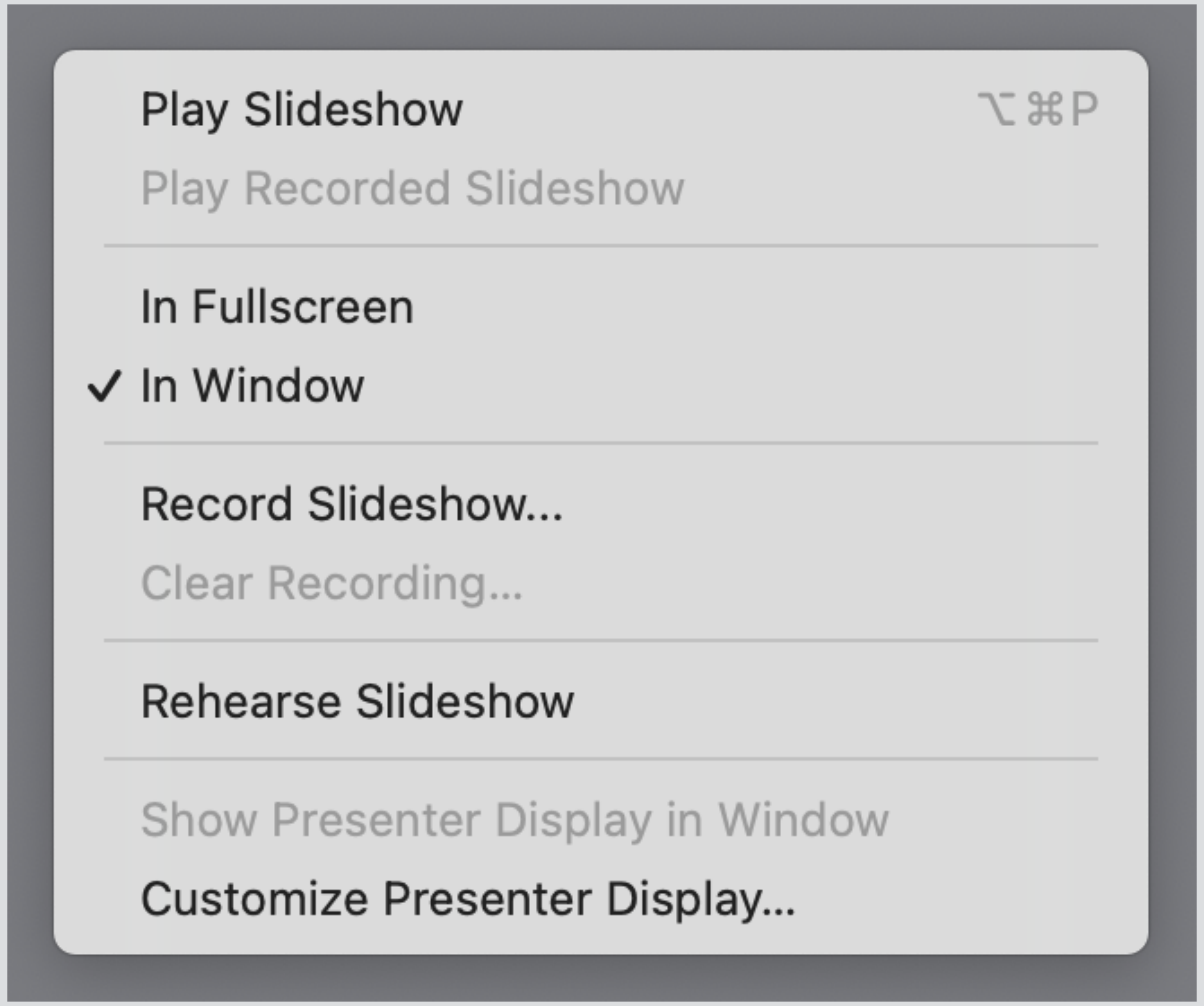

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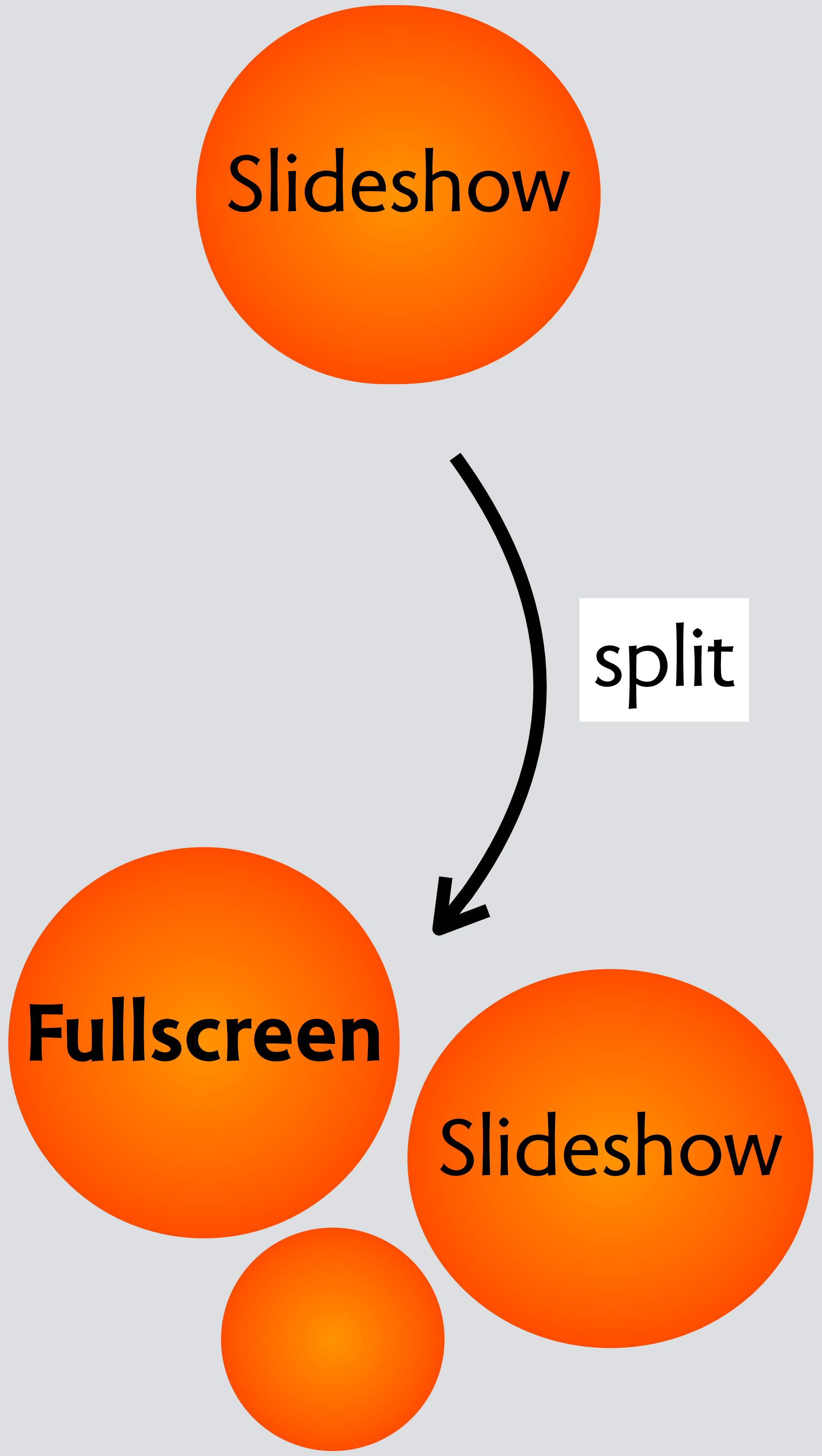
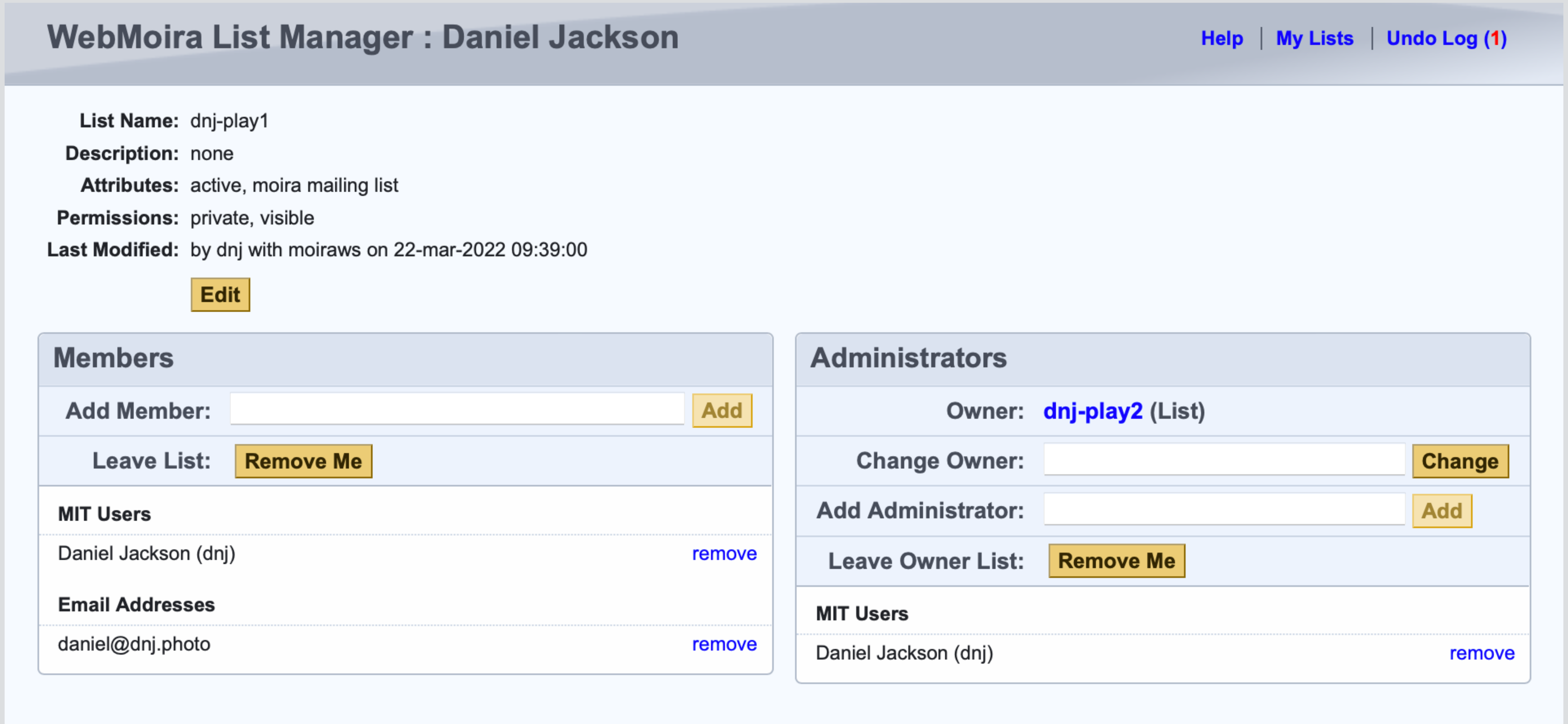


unify: subsuming access control in MIT's Moira



WebMoira List Manager : Daniel Jackson

List Name:	dnj-play1
Description:	none
Attributes:	active, moira mailing list
Permissions:	private, visible
Last Modified:	by dnj with moiraws on 22-mar-2022 09:39:00

Members

Add Member:

Leave List:

MIT Users

Daniel Jackson (dnj)

Email Addresses

daniel@dnj.photo

Administrators

Owner: dnj-play2 (List)

Change Owner:

Add Administrator:

Leave Owner List:

MIT Users

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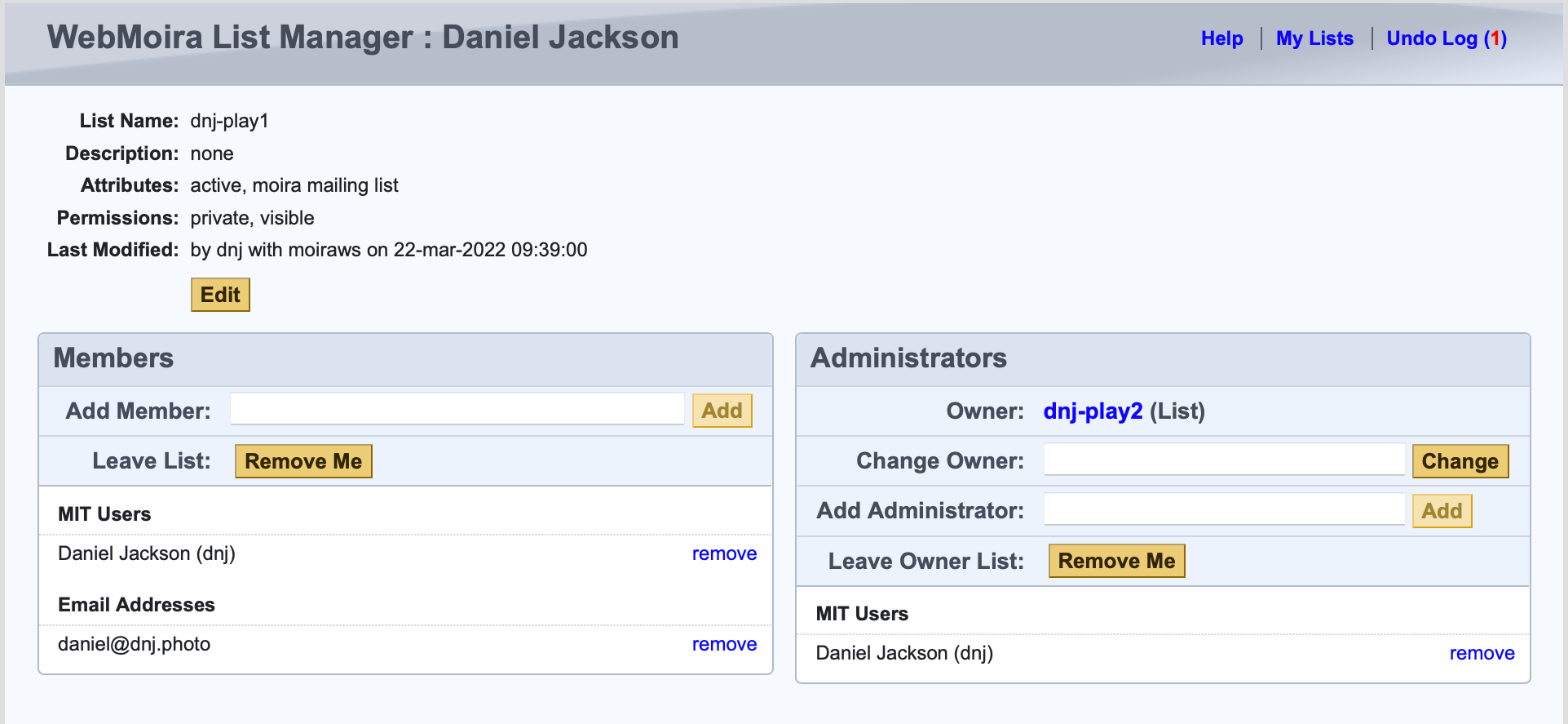

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Email Addresses

daniel@dnj.photo remove

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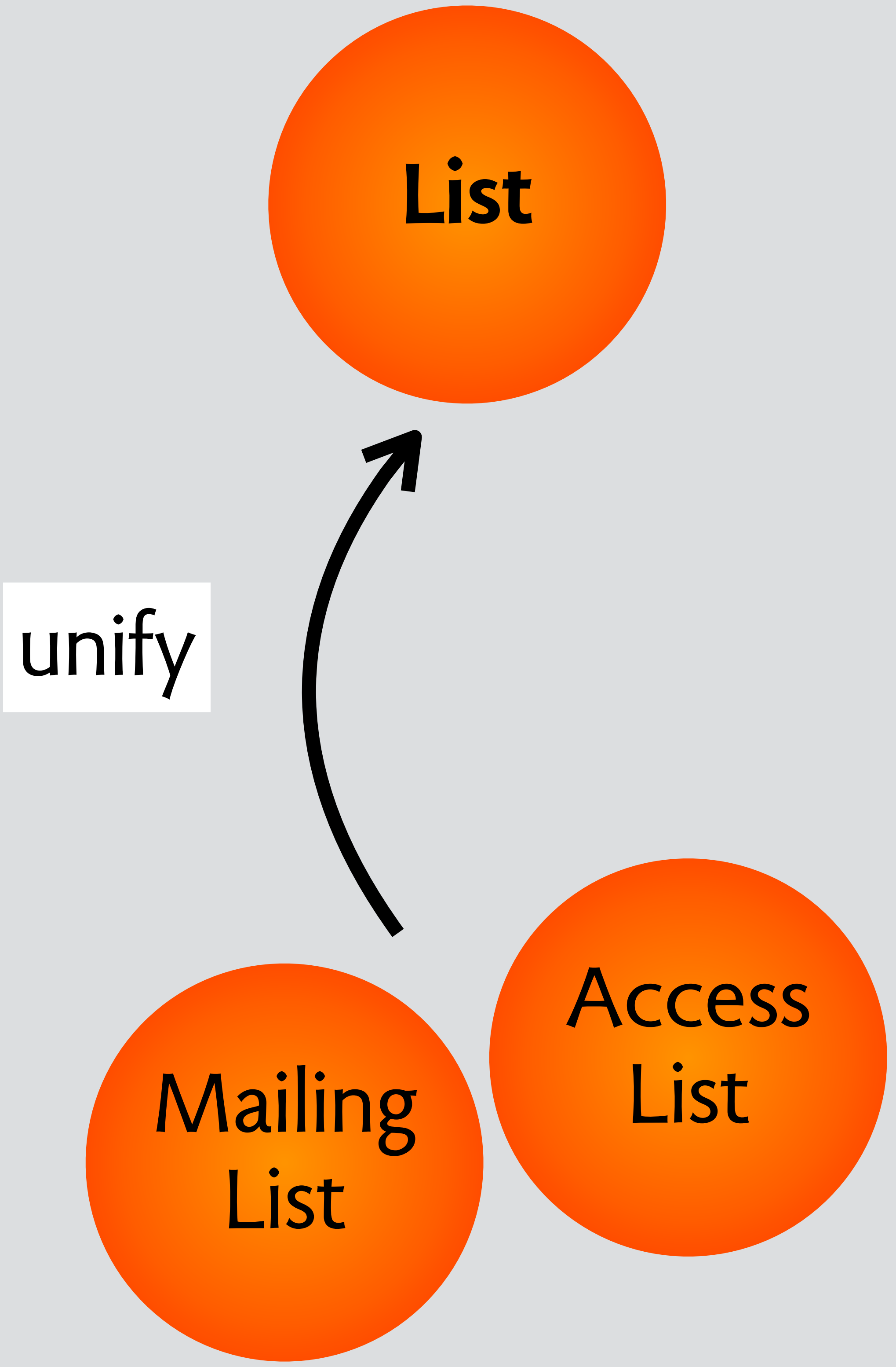
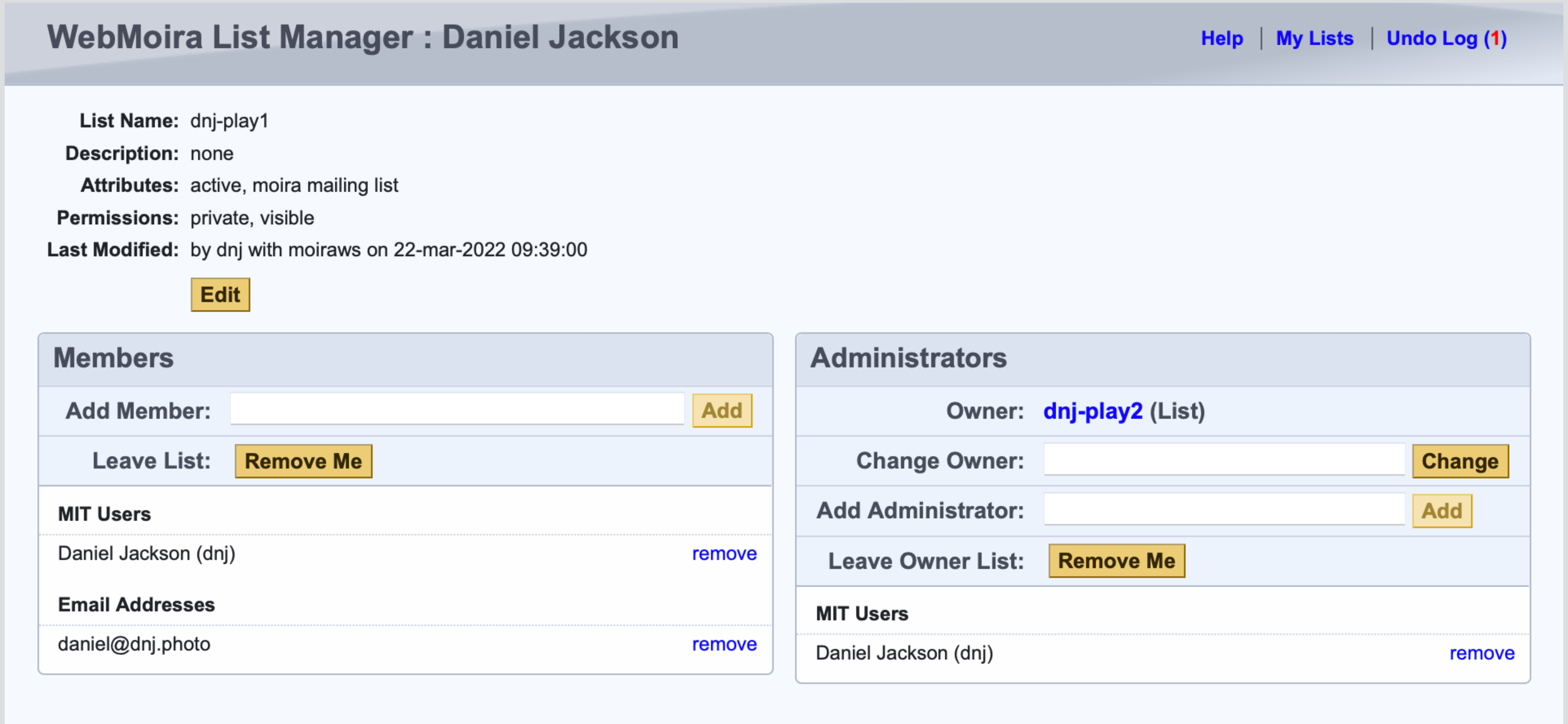


unify: subsuming access control in MIT's Moira

can toggle mailing list attribute



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Help | My Lists | Undo Log (1)

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Edit

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Leave List: Remove Me

MIT Users

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Email Addresses

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Change Owner: Change

Add Administrator: Add

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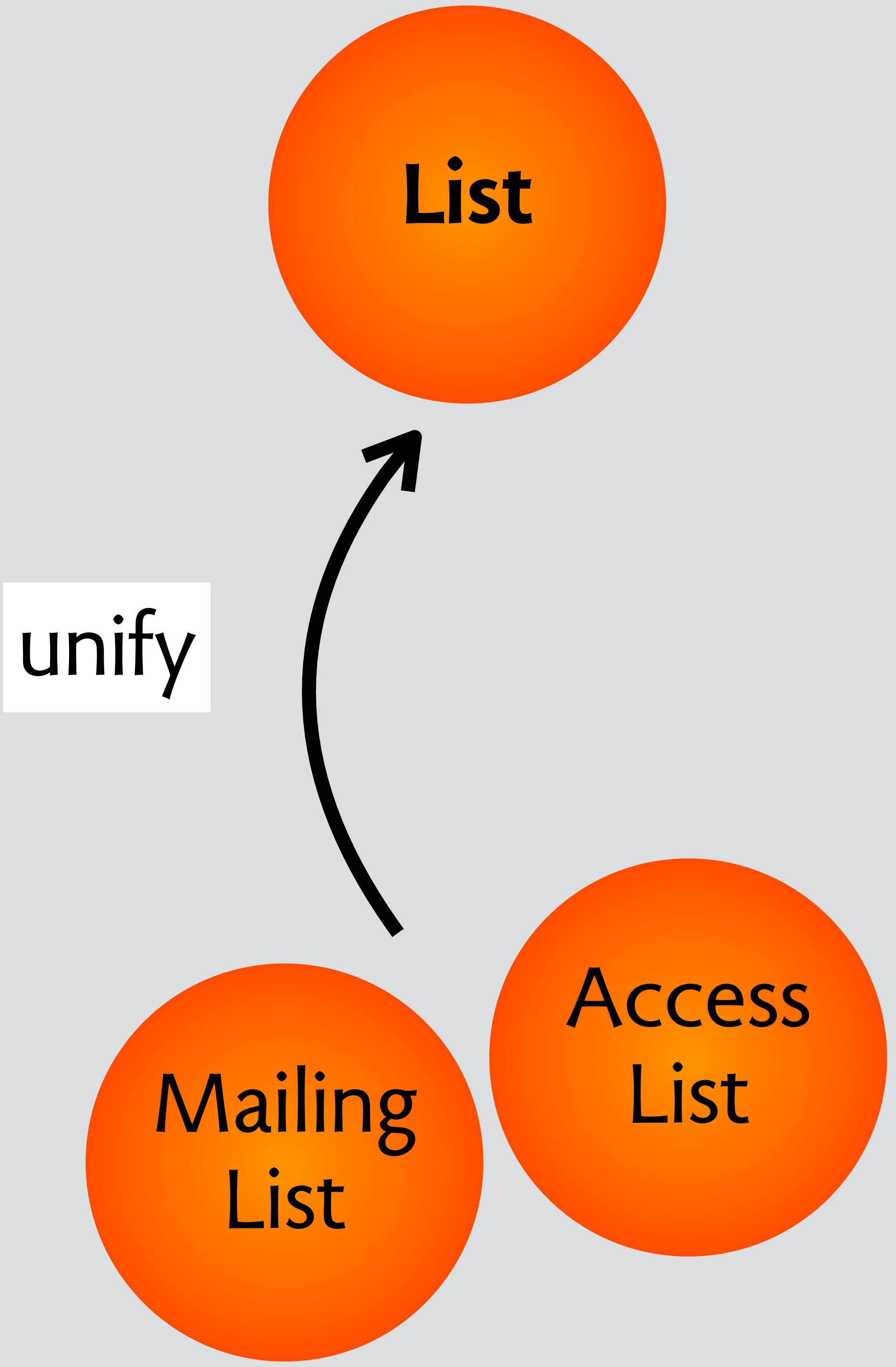

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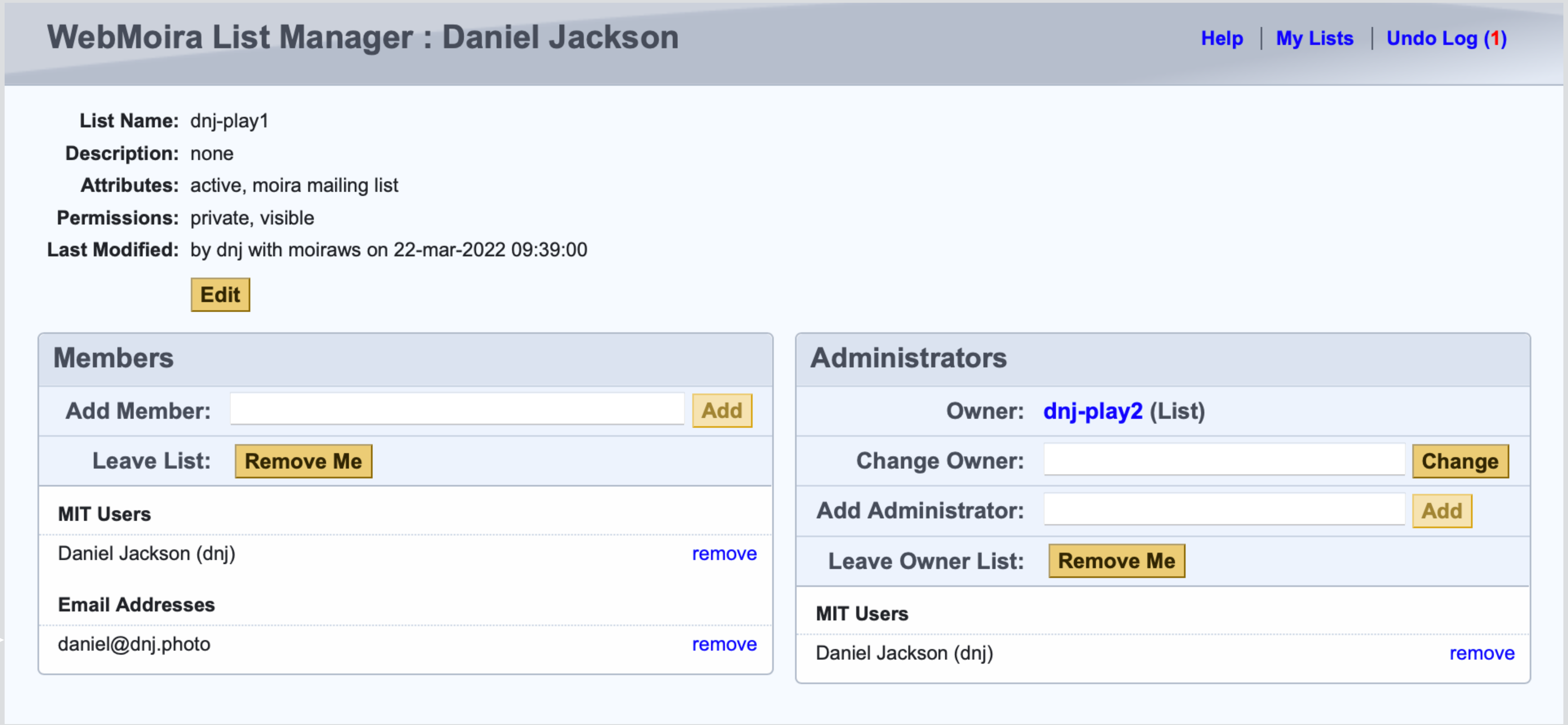
can toggle mailing list attribute

can create admin list with no login users!



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Leave List: Remove Me

MIT Users

Daniel Jackson (dnj) remove

Email Addresses

daniel@dnj.photo remove

Administrators

Owner: dnj-play2 (List)

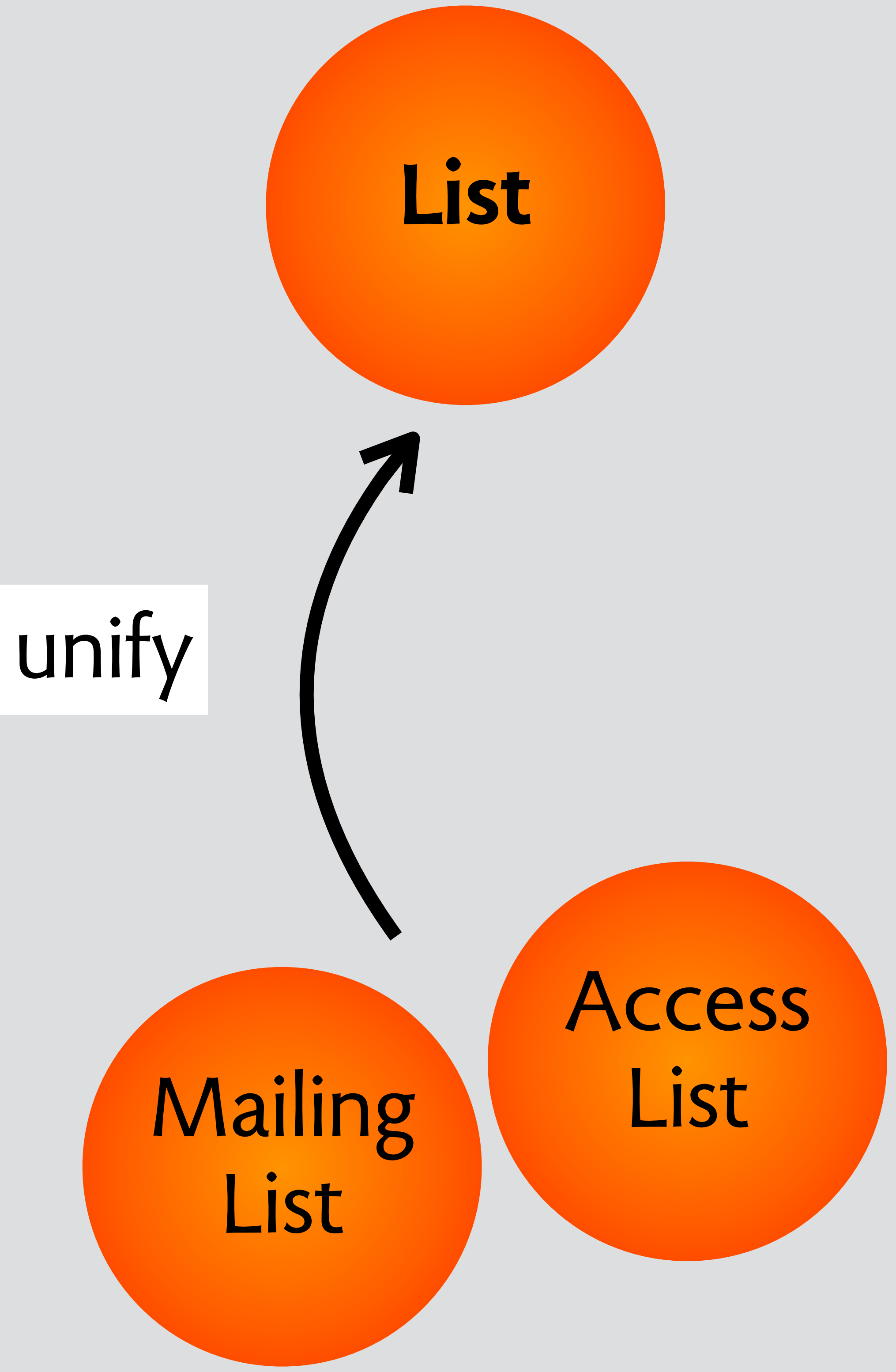
Change Owner: Change

Add Administrator: Add

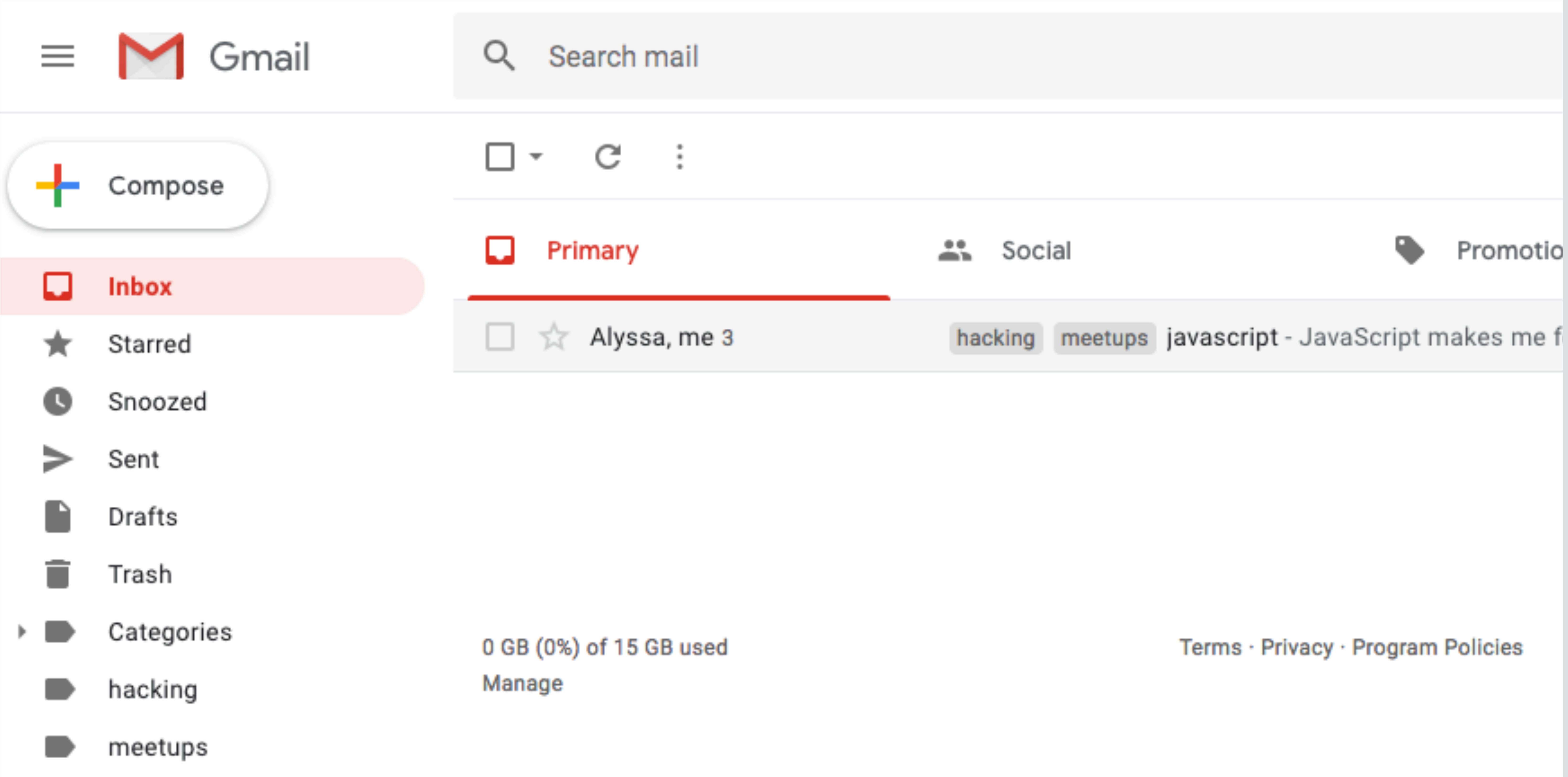
Leave Owner List: Remove Me

MIT Users

Daniel Jackson (dnj) remove



tighten: label and trash concepts in Gmail

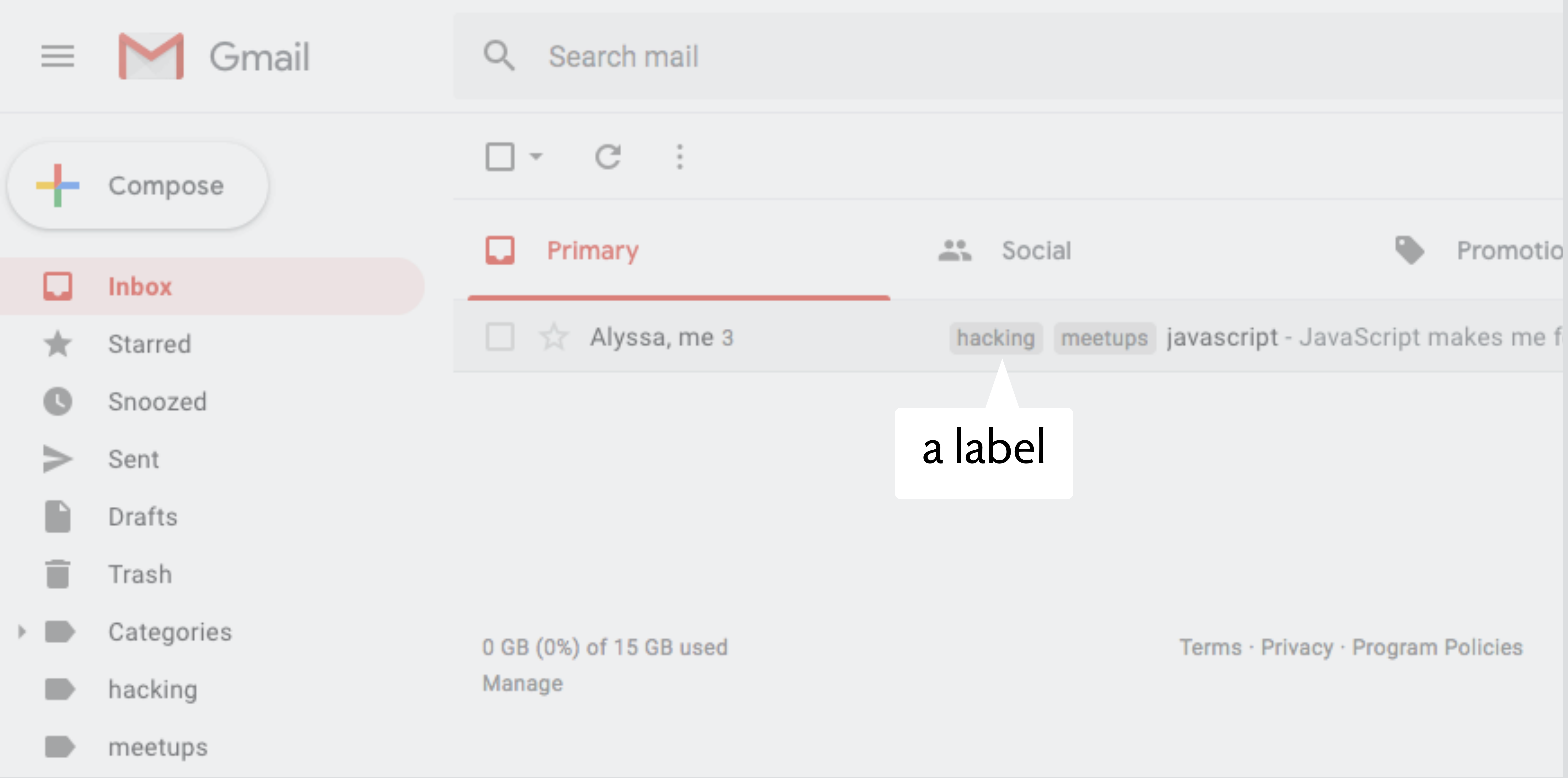


□ ☆ Alyssa, me 3 hacking meetups javascript - JavaScript makes me f

0 GB (0%) of 15 GB used
Manage

Terms · Privacy · Program Policies

tighten: label and trash concepts in Gmail



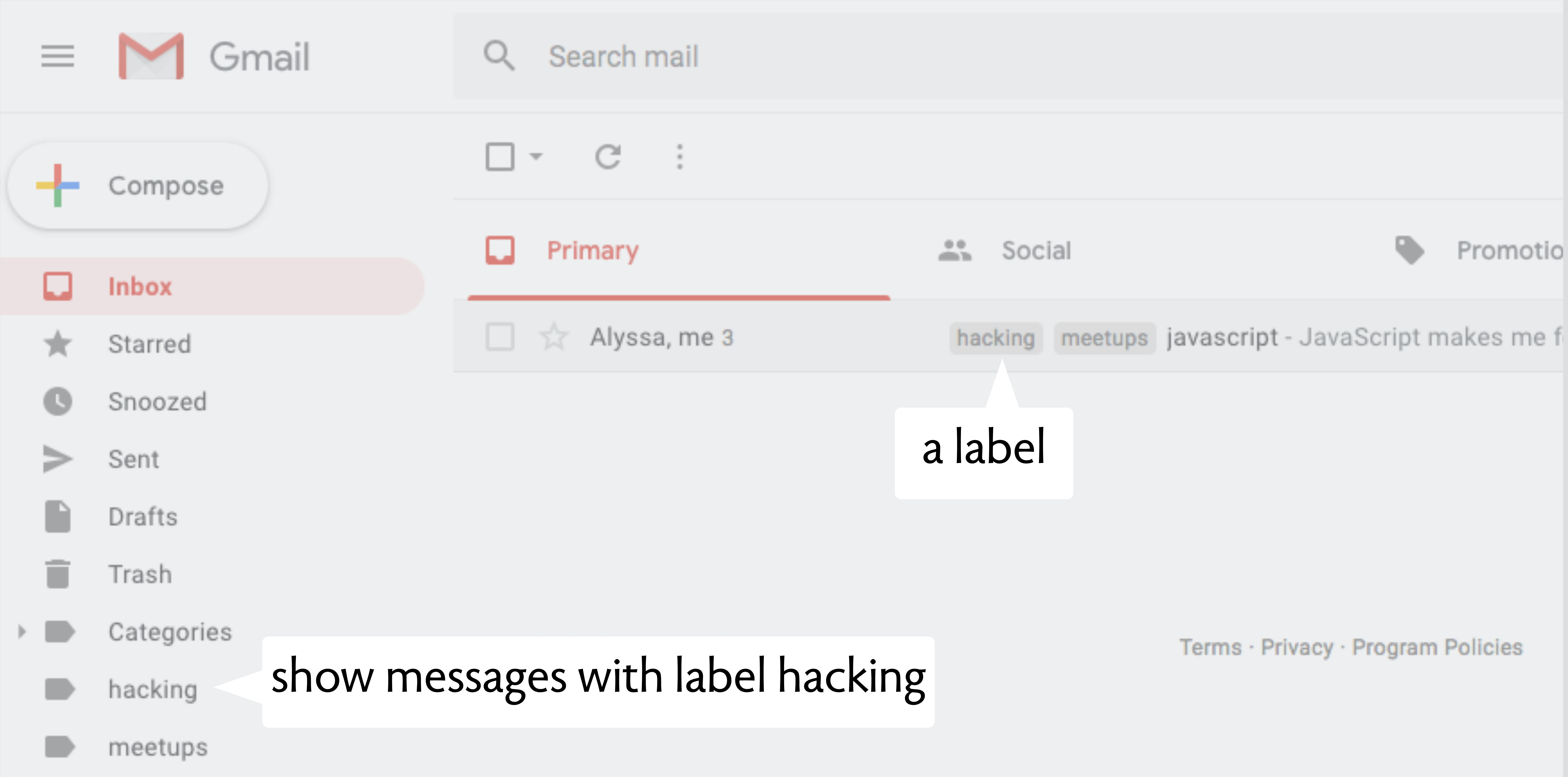
Alyssa, me 3 hacking meetups javascript - JavaScript makes me f

0 GB (0%) of 15 GB used
Manage

Terms · Privacy · Program Policies

a label

tighten: label and trash concepts in Gmail

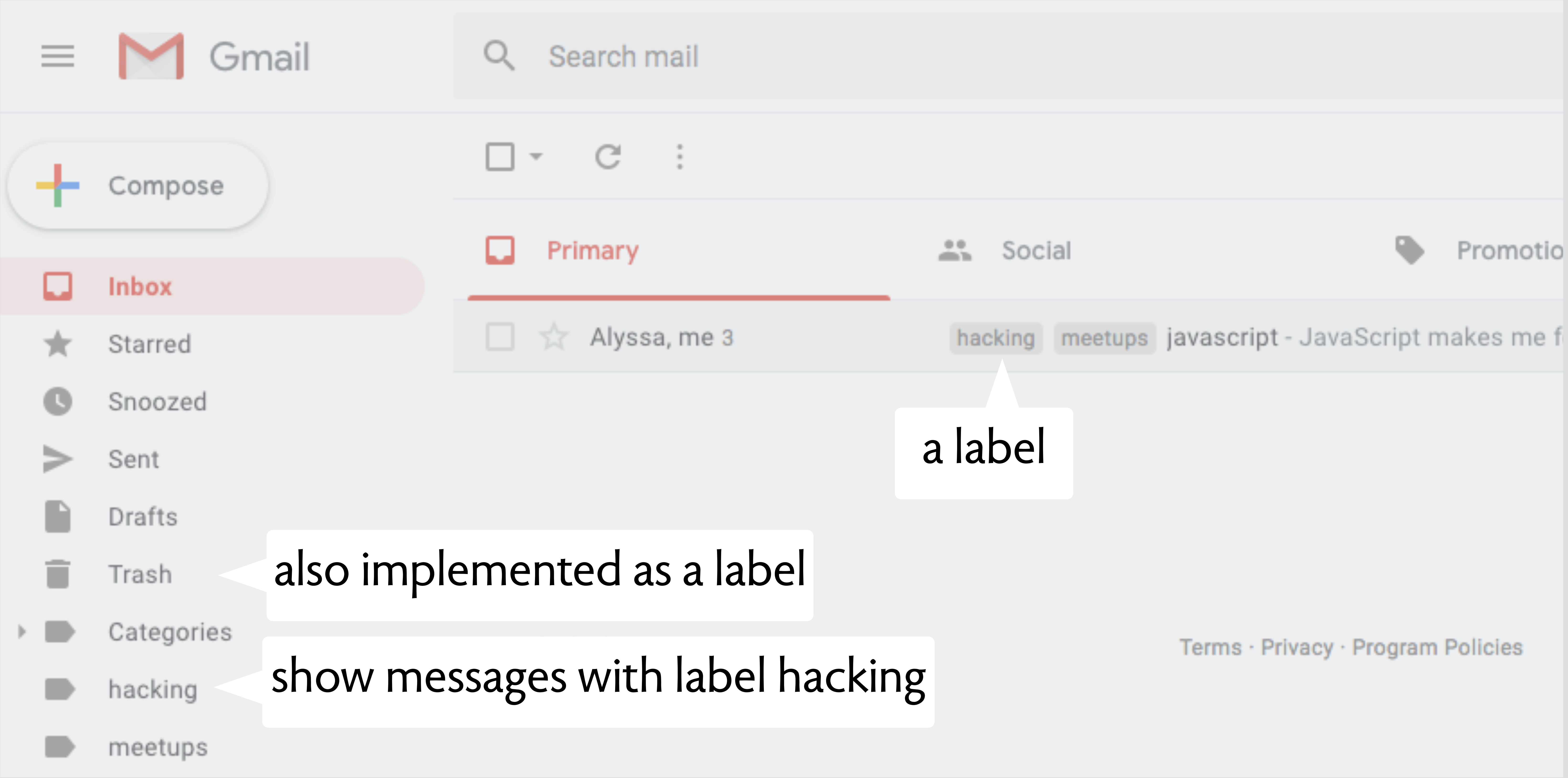


Alyssa, me 3 hacking meetups javascript - JavaScript makes me f

a label

show messages with label hacking

tighten: label and trash concepts in Gmail



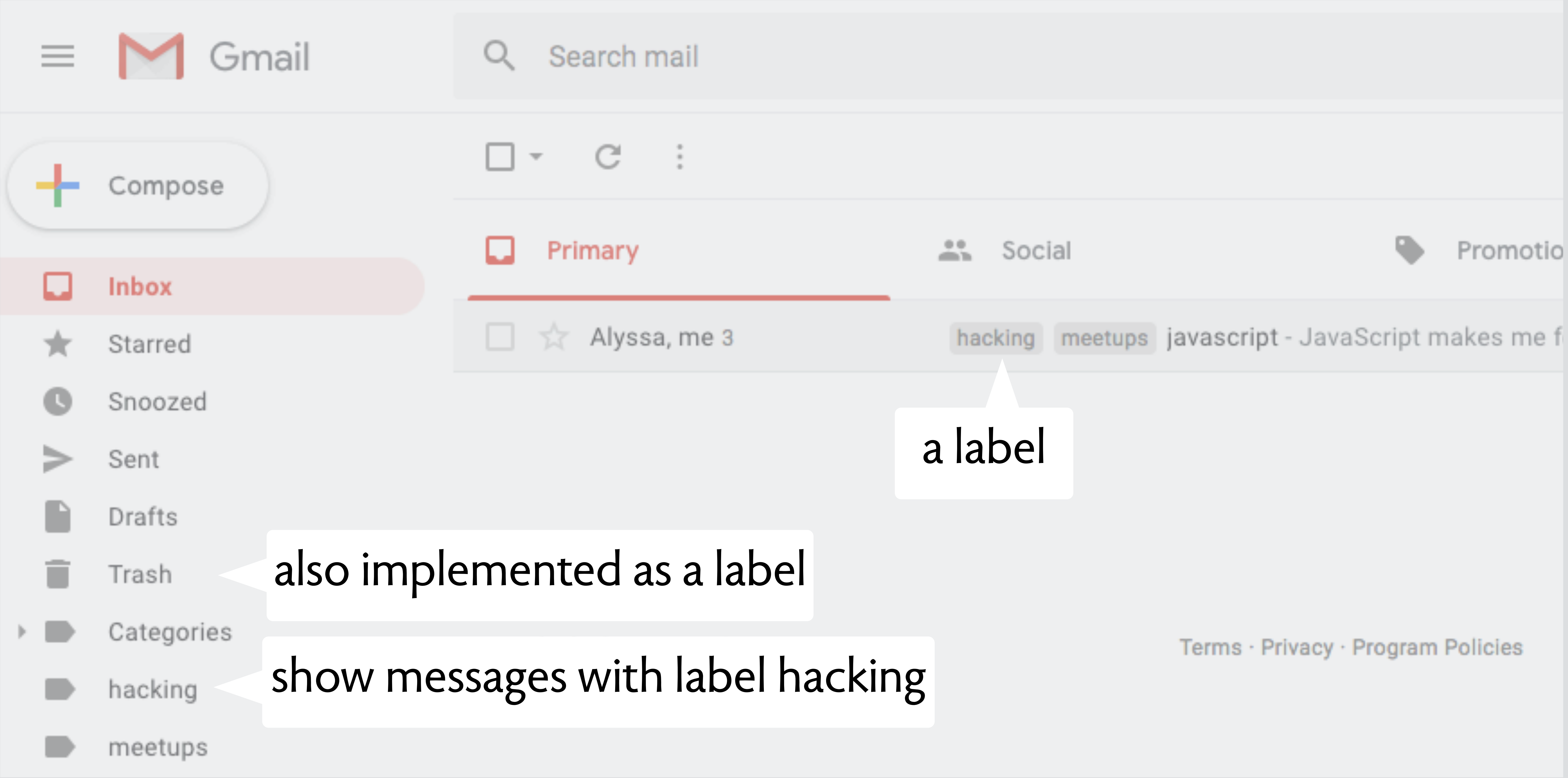
Alyssa, me 3 hacking meetups javascript - JavaScript makes me f

a label

also implemented as a label

show messages with label hacking

tighten: label and trash concepts in Gmail



Alyssa, me 3 hacking meetups javascript - JavaScript makes me f

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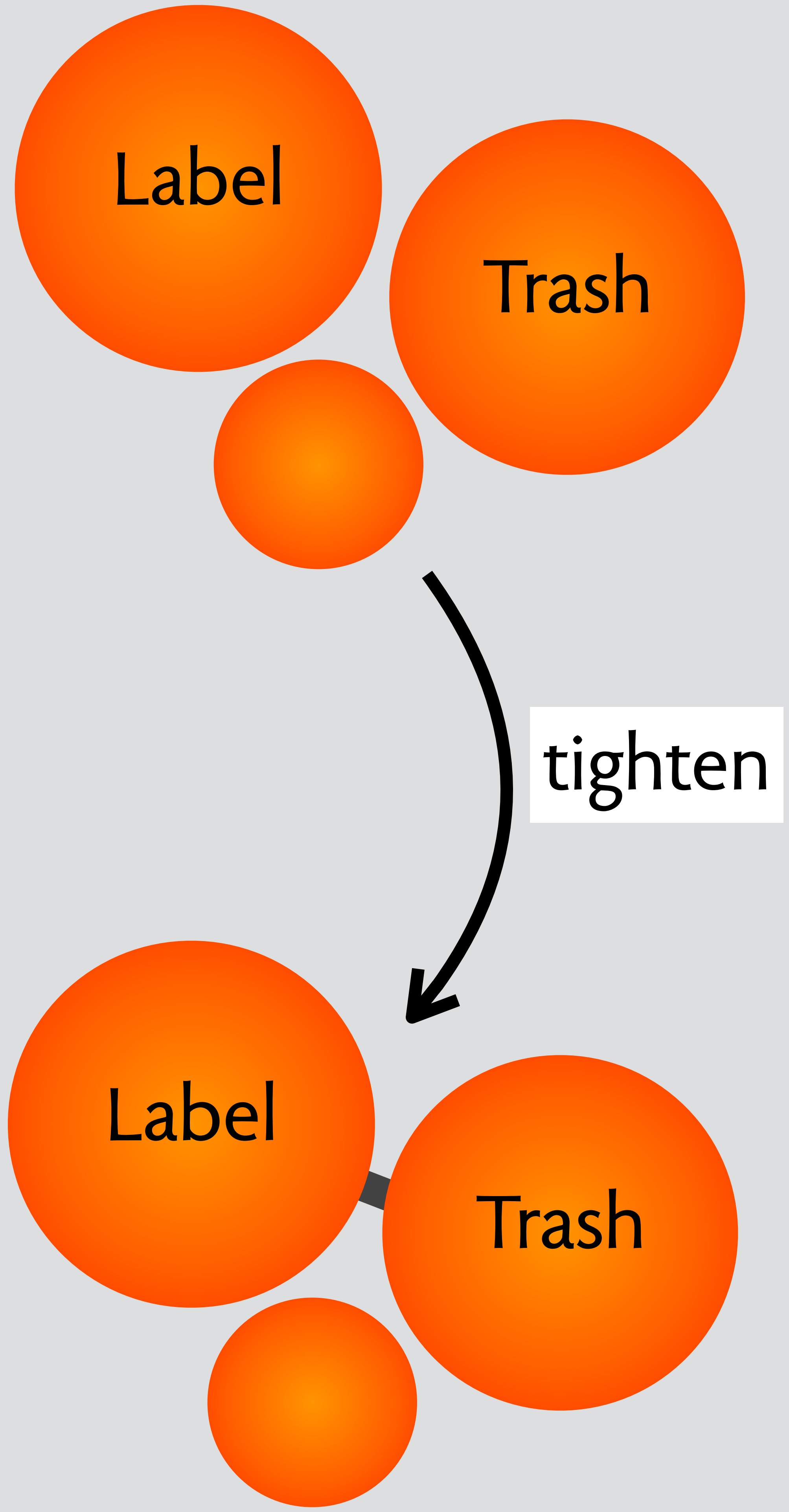


concept trash

purpose undo deletion

structure
trash: **set** Item

actions
delete (i: Item)
restore (i: Item)
empty ()

concept trash

purpose undo deletion

structure
trash: **set** Item

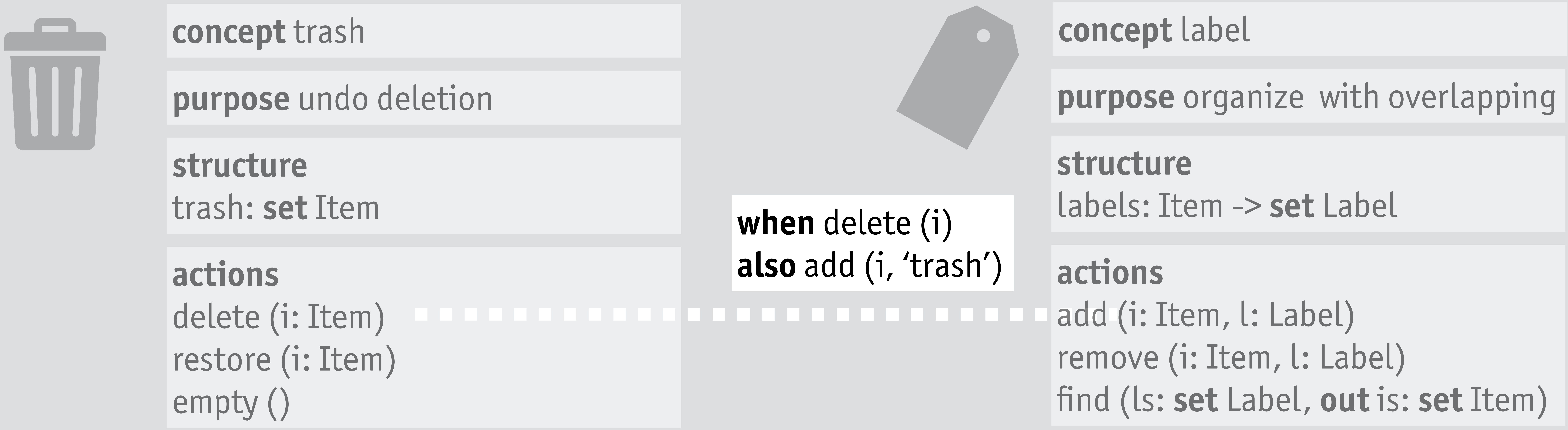
actions
delete (i: Item)
restore (i: Item)
empty ()

concept label

purpose organize with overlapping

structure
labels: Item -> **set** Label

actions
add (i: Item, l: Label)
remove (i: Item, l: Label)
find (ls: **set** Label, **out** is: **set** Item)



concept trash

purpose undo deletion

structure
trash: **set** Item

actions
delete (i: Item)
restore (i: Item)
empty ()

when delete (i)
also add (i, ‘trash’)

concept label

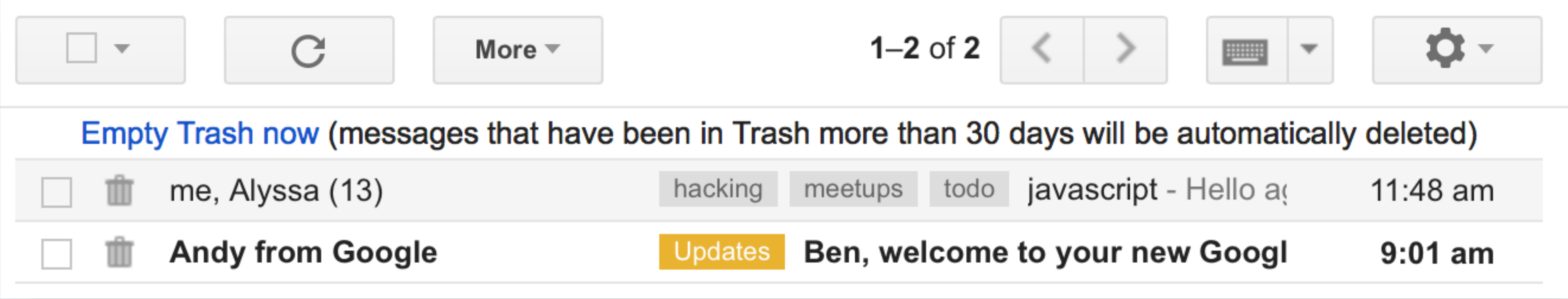
purpose organize with overlapping

structure
labels: Item -> **set** Label

actions
add (i: Item, l: Label)
remove (i: Item, l: Label)
find (ls: **set** Label, **out** is: **set** Item)

integrating these concepts is tricky

click on trash

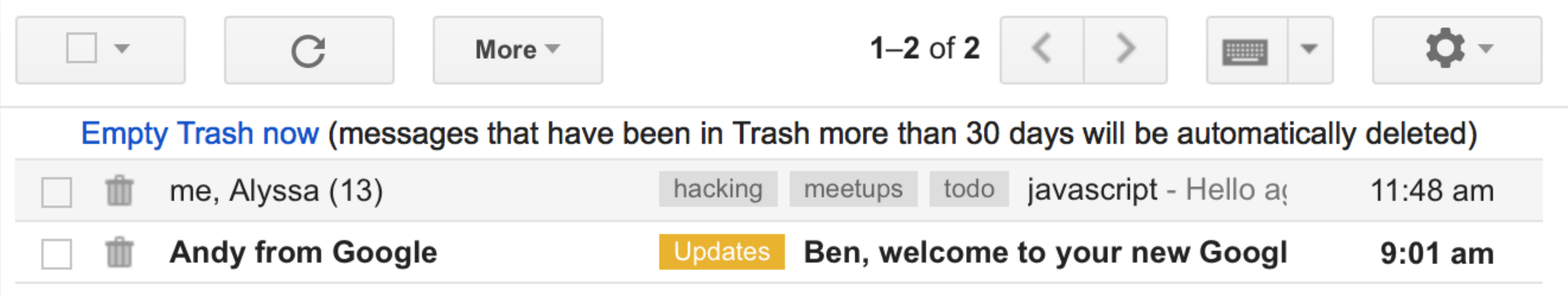


Empty Trash now (messages that have been in Trash more than 30 days will be automatically deleted)

□	me, Alyssa (13)	hacking meetups todo	javascript - Hello ag	11:48 am
□	**Andy from Google**	Updates	**Ben, welcome to your new Googl**	**9:01 am**

integrating these concepts is tricky

click on trash



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me, Alyssa (13)	hacking meetups todo	javascript - Hello ag	11:48 am
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filter on todo label

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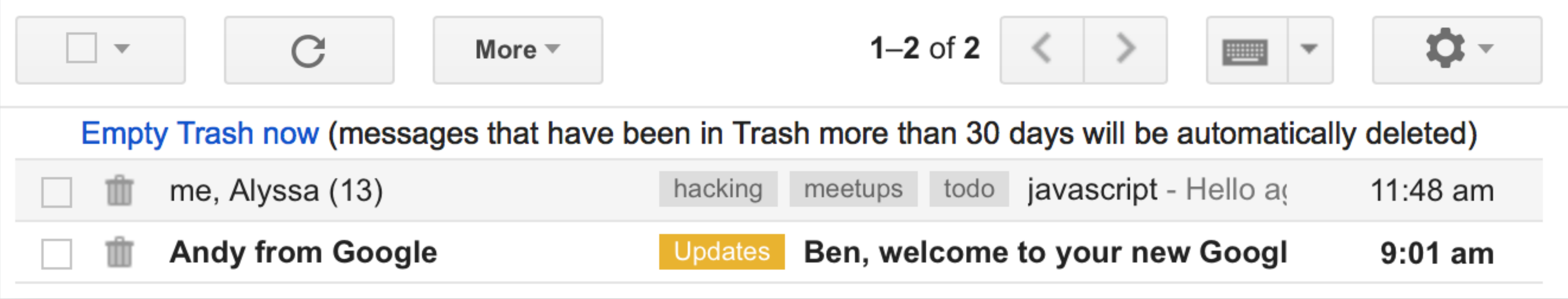
click on trash



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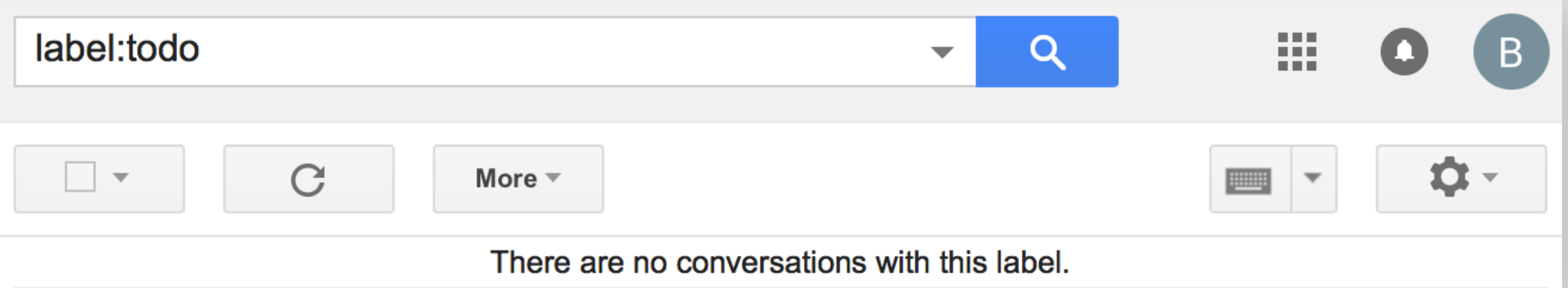
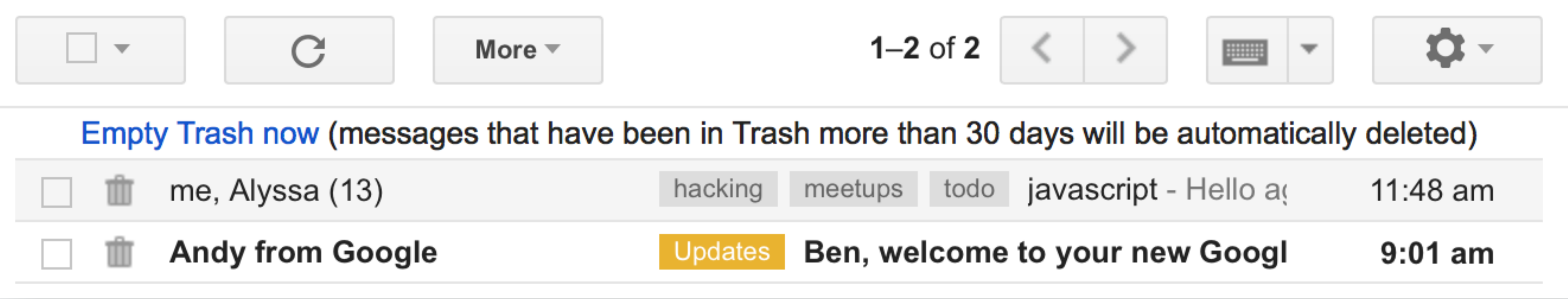

label:todo

There are no conversations with this label.

integrating these concepts is tricky

click on trash



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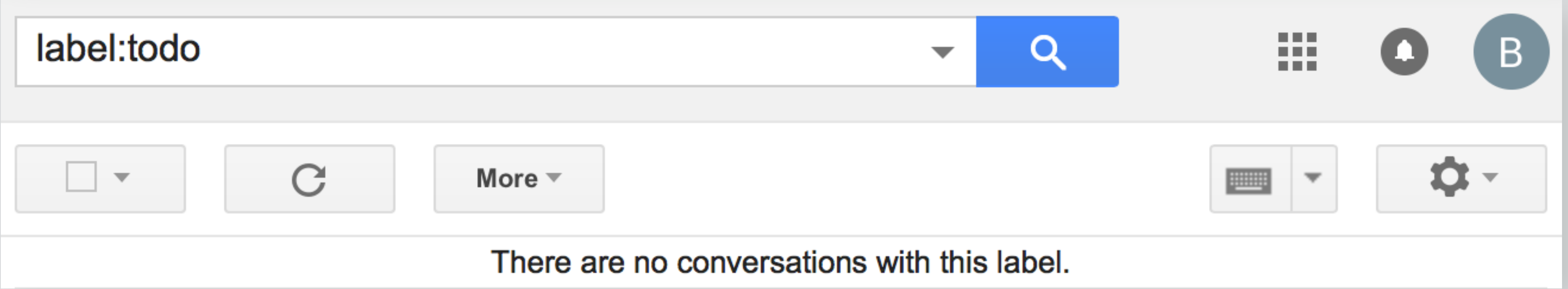
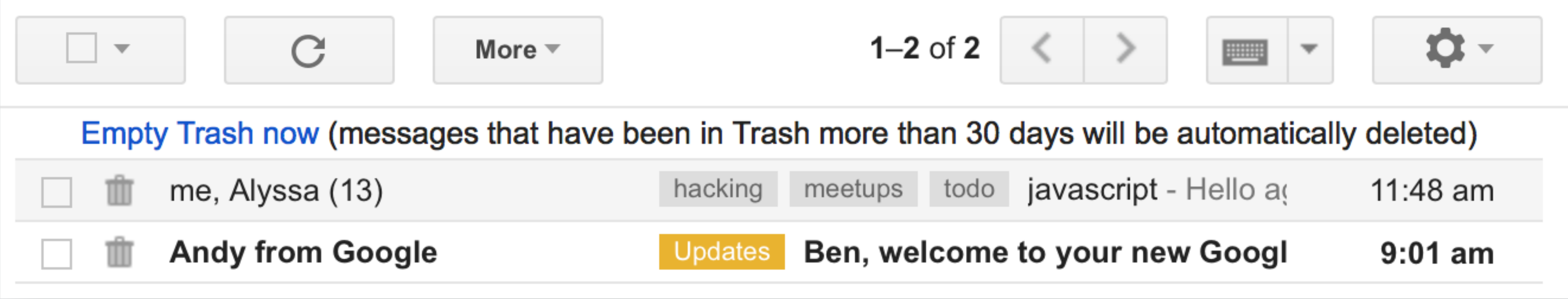


There are no conversations with this label.

filter on todo and trash

integrating these concepts is tricky

click on trash



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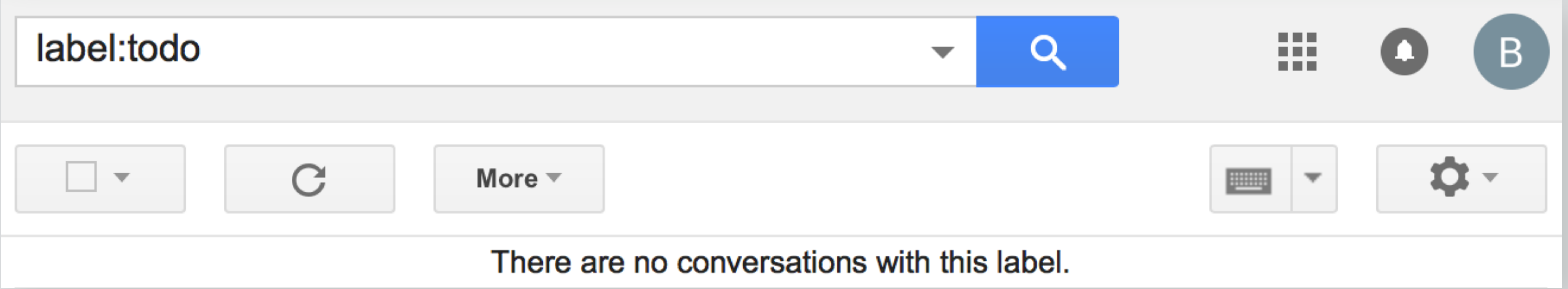
filter on todo label



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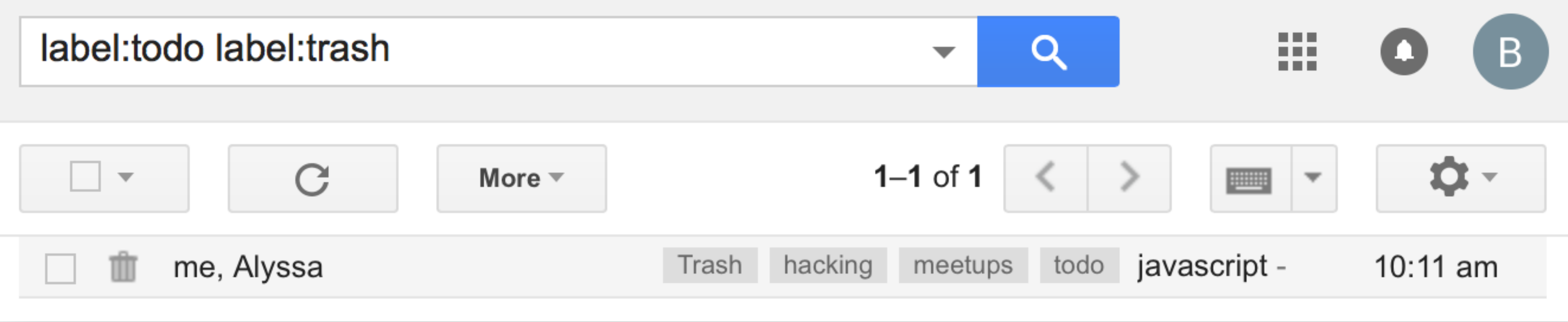
There are no conversations with this label.

filter on todo and trash

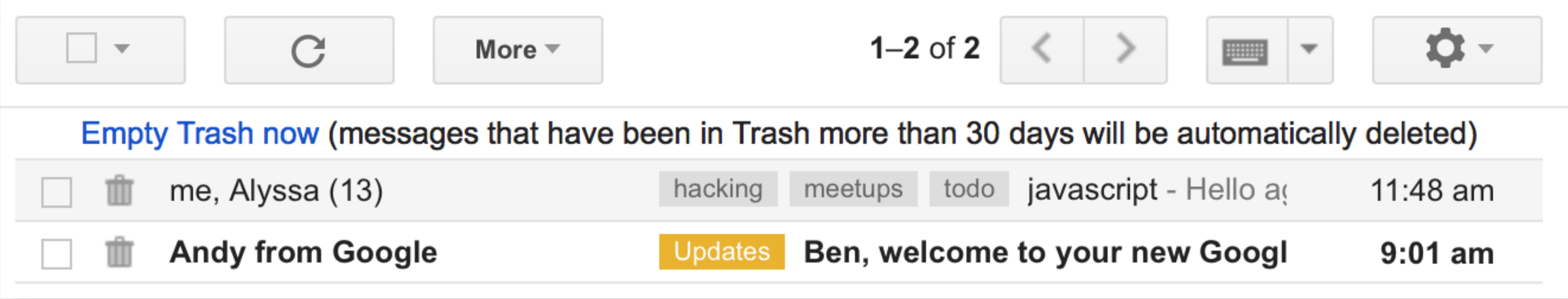


label:todo label:trash

□ me, Alyssa Trash hacking meetups todo javascript - 10:11 am

integrating these concepts is tricky

click on trash



1–2 of 2

Empty Trash now (messages that have been in Trash more than 30 days will be automatically deleted)

□ me, Alyssa (13) hacking meetups todo javascript - Hello a 11:48 am

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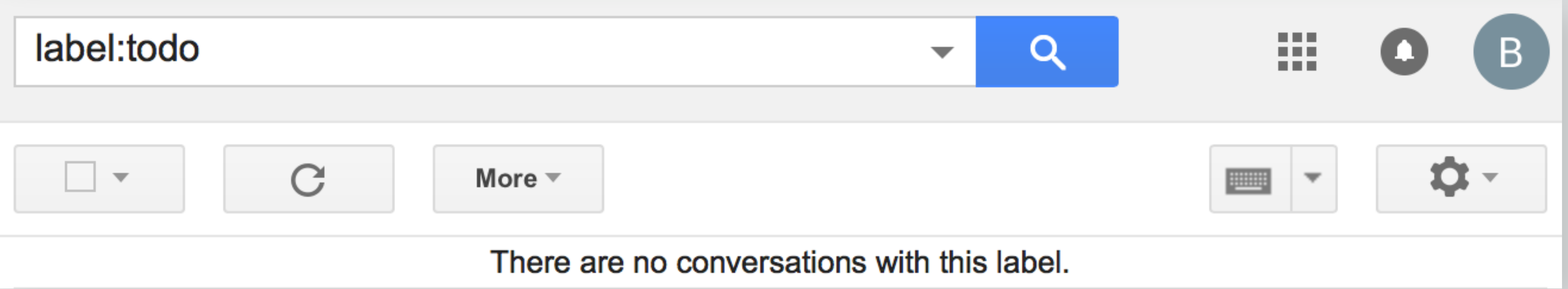
filter on todo label



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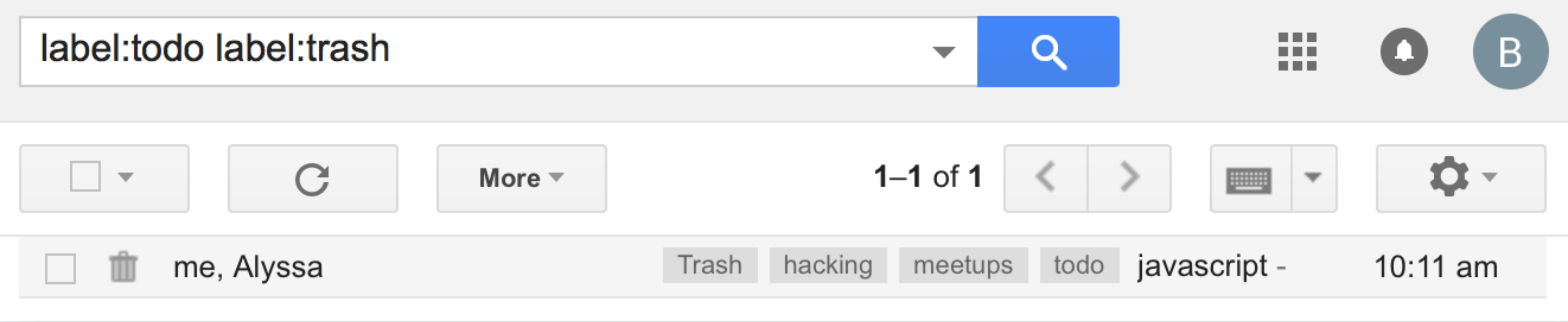
There are no conversations with this label.

filter on todo and trash

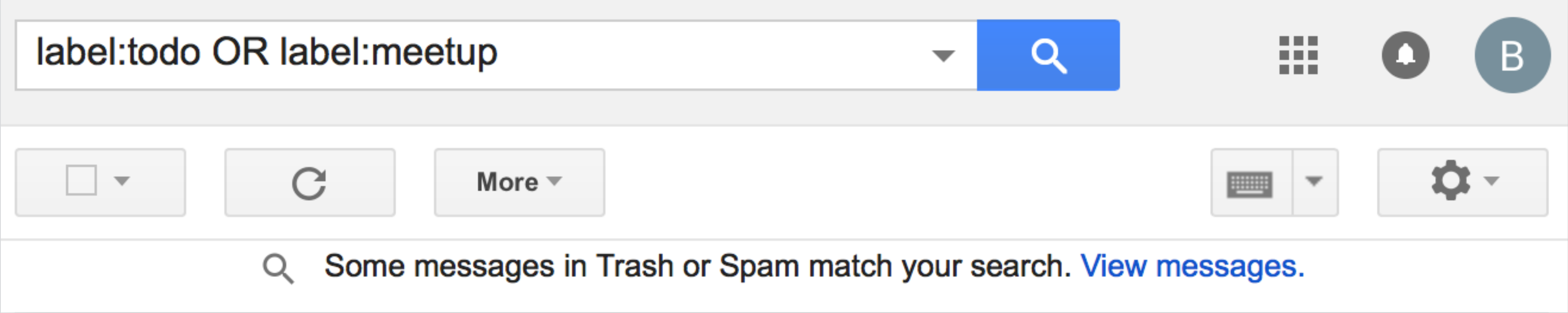


label:todo label:trash

1–1 of 1

□ me, Alyssa Trash hacking meetups todo javascript - 10:11 am

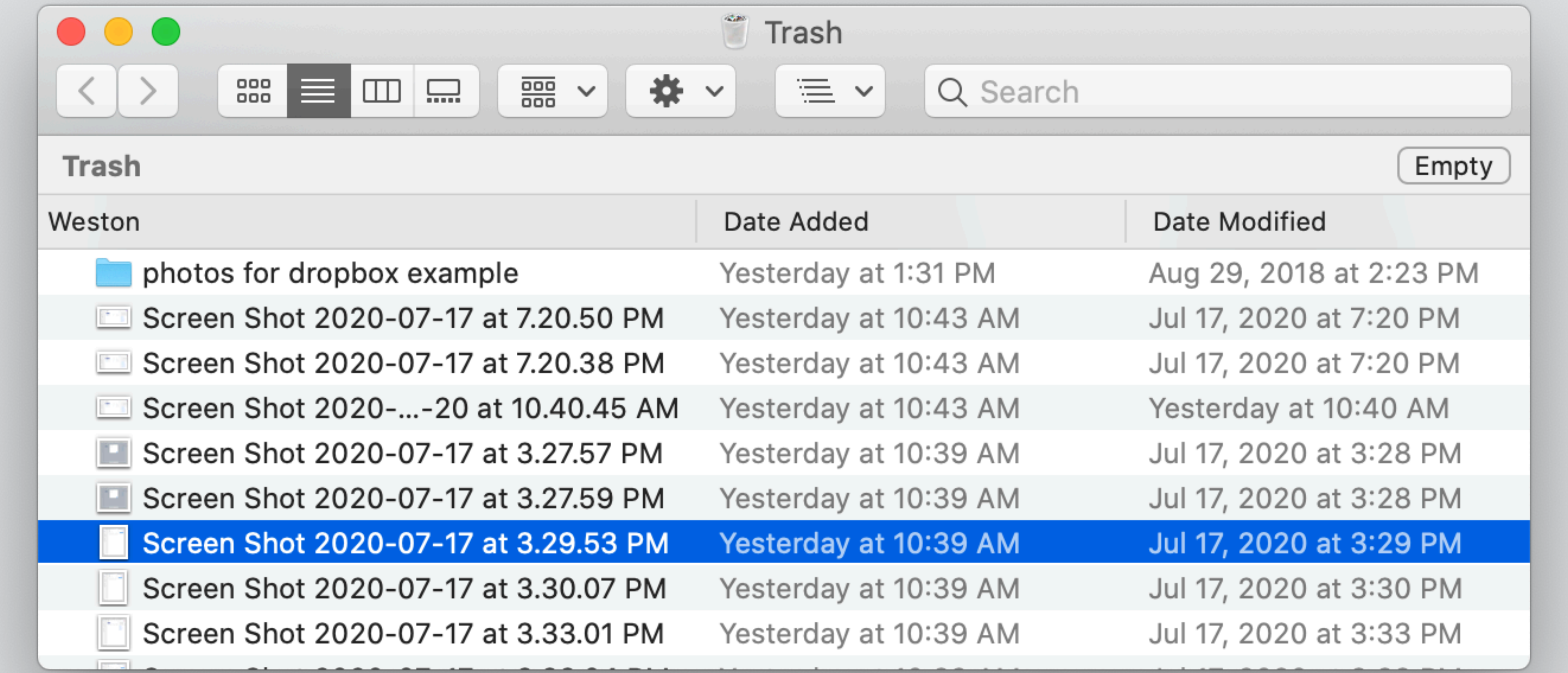
filter on something else



label:todo OR label:meetup

Some messages in Trash or Spam match your search. View messages.

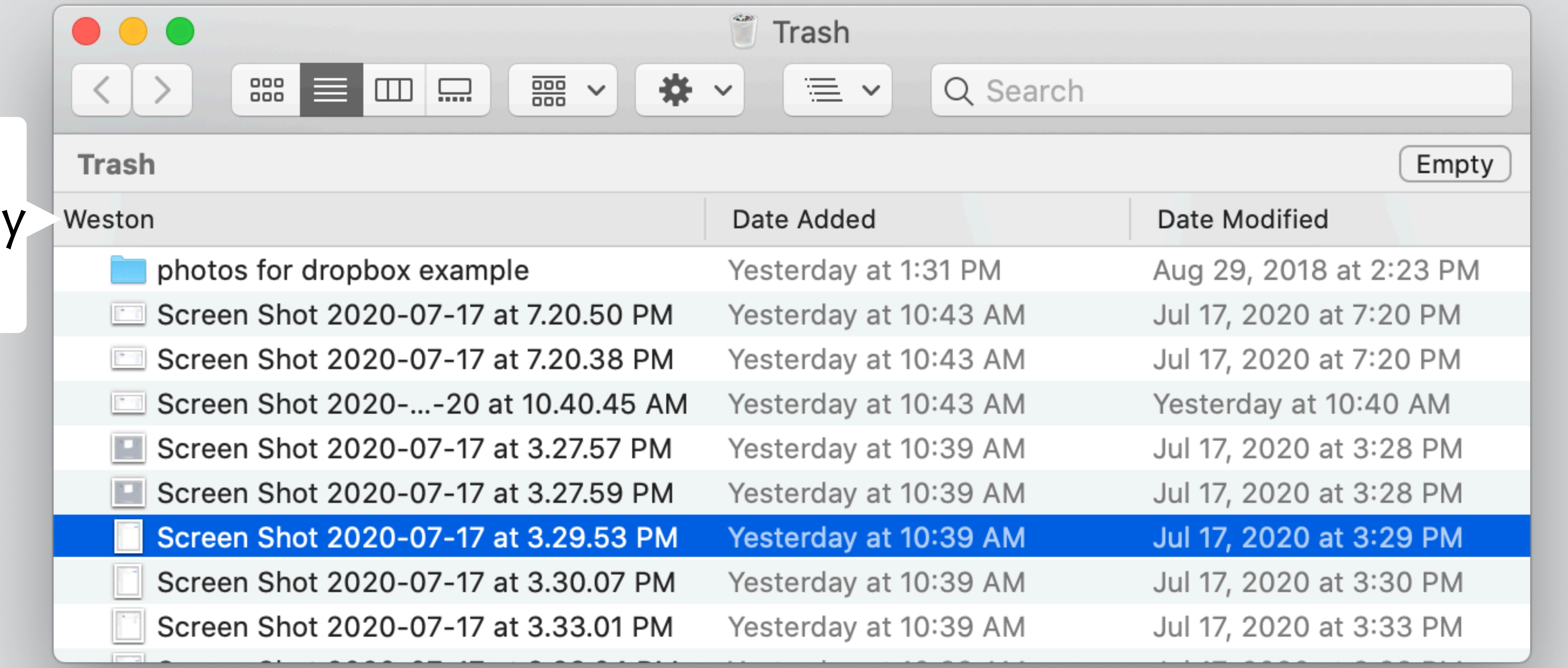
a beautiful (but tricky) synergy



Weston	Date Added	Date Modified
photos for dropbox example	Yesterday at 1:31 PM	Aug 29, 2018 at 2:23 PM
Screen Shot 2020-07-17 at 7.20.50 PM	Yesterday at 10:43 AM	Jul 17, 2020 at 7:20 PM
Screen Shot 2020-07-17 at 7.20.38 PM	Yesterday at 10:43 AM	Jul 17, 2020 at 7:20 PM
Screen Shot 2020-...-20 at 10.40.45 AM	Yesterday at 10:43 AM	Yesterday at 10:40 AM
Screen Shot 2020-07-17 at 3.27.57 PM	Yesterday at 10:39 AM	Jul 17, 2020 at 3:28 PM
Screen Shot 2020-07-17 at 3.27.59 PM	Yesterday at 10:39 AM	Jul 17, 2020 at 3:28 PM
Screen Shot 2020-07-17 at 3.29.53 PM	Yesterday at 10:39 AM	Jul 17, 2020 at 3:29 PM
Screen Shot 2020-07-17 at 3.30.07 PM	Yesterday at 10:39 AM	Jul 17, 2020 at 3:30 PM
Screen Shot 2020-07-17 at 3.33.01 PM	Yesterday at 10:39 AM	Jul 17, 2020 at 3:33 PM

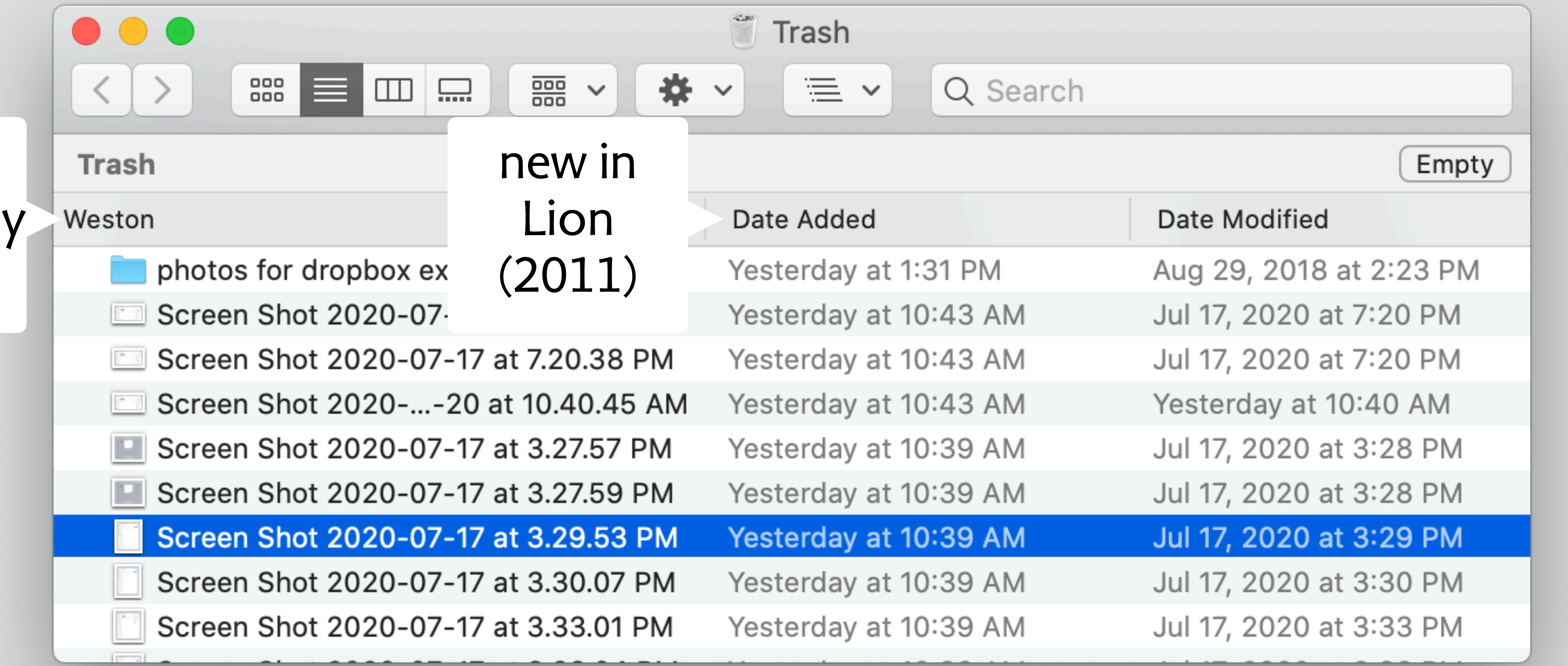
a beautiful (but tricky) synergy

folder sortable by volume!



Weston	Date Added	Date Modified
photos for dropbox example	Yesterday at 1:31 PM	Aug 29, 2018 at 2:23 PM
Screen Shot 2020-07-17 at 7.20.50 PM	Yesterday at 10:43 AM	Jul 17, 2020 at 7:20 PM
Screen Shot 2020-07-17 at 7.20.38 PM	Yesterday at 10:43 AM	Jul 17, 2020 at 7:20 PM
Screen Shot 2020-...-20 at 10.40.45 AM	Yesterday at 10:43 AM	Yesterday at 10:40 AM
Screen Shot 2020-07-17 at 3.27.57 PM	Yesterday at 10:39 AM	Jul 17, 2020 at 3:28 PM
Screen Shot 2020-07-17 at 3.27.59 PM	Yesterday at 10:39 AM	Jul 17, 2020 at 3:28 PM
Screen Shot 2020-07-17 at 3.29.53 PM	Yesterday at 10:39 AM	Jul 17, 2020 at 3:29 PM
Screen Shot 2020-07-17 at 3.30.07 PM	Yesterday at 10:39 AM	Jul 17, 2020 at 3:30 PM
Screen Shot 2020-07-17 at 3.33.01 PM	Yesterday at 10:39 AM	Jul 17, 2020 at 3:33 PM

a beautiful (but tricky) synergy



Weston	Date Added	Date Modified
photos for dropbox ex	Yesterday at 1:31 PM	Aug 29, 2018 at 2:23 PM
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Screen Shot 2020-07-17 at 7.20.38 PM	Yesterday at 10:43 AM	Jul 17, 2020 at 7:20 PM
Screen Shot 2020-...-20 at 10.40.45 AM	Yesterday at 10:43 AM	Yesterday at 10:40 AM
Screen Shot 2020-07-17 at 3.27.57 PM	Yesterday at 10:39 AM	Jul 17, 2020 at 3:28 PM
Screen Shot 2020-07-17 at 3.27.59 PM	Yesterday at 10:39 AM	Jul 17, 2020 at 3:28 PM
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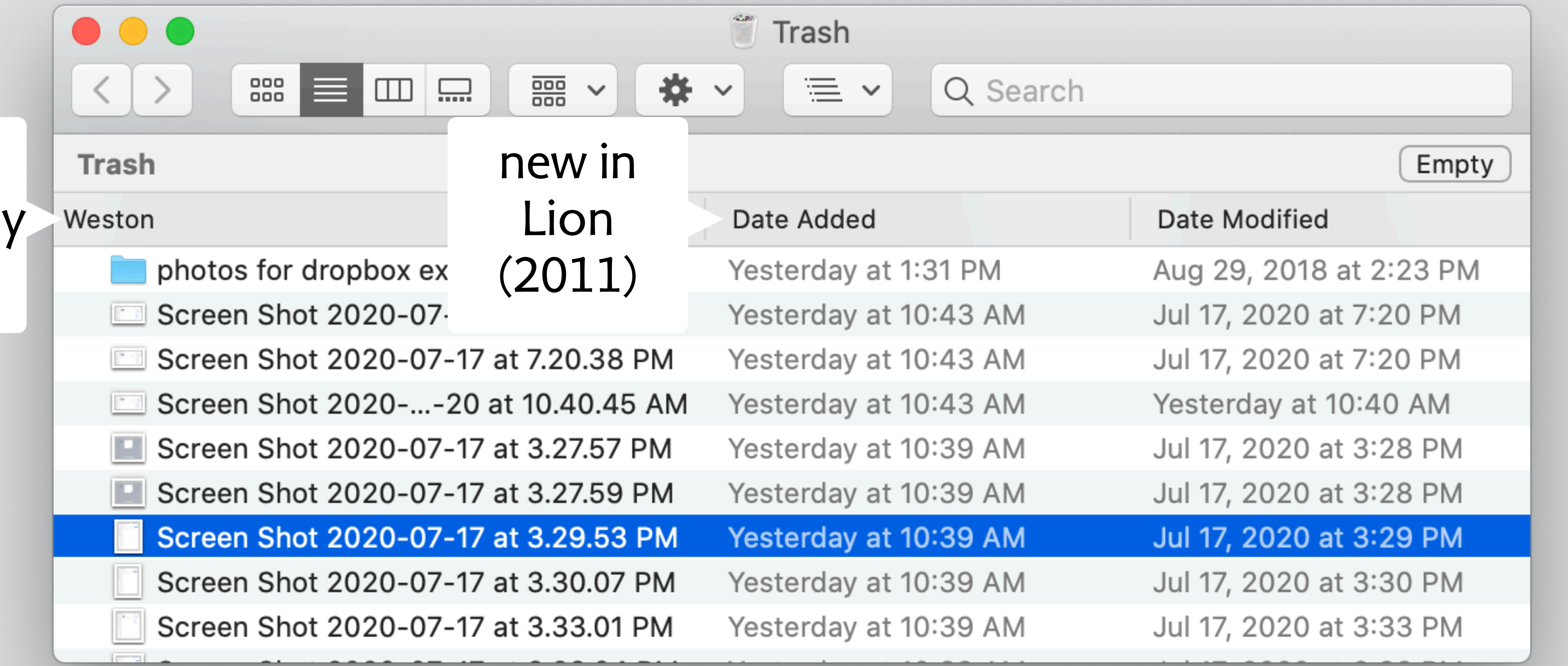
folder sortable by volume!

new in Lion (2011)

a beautiful (but tricky) synergy

folder sortable by volume!



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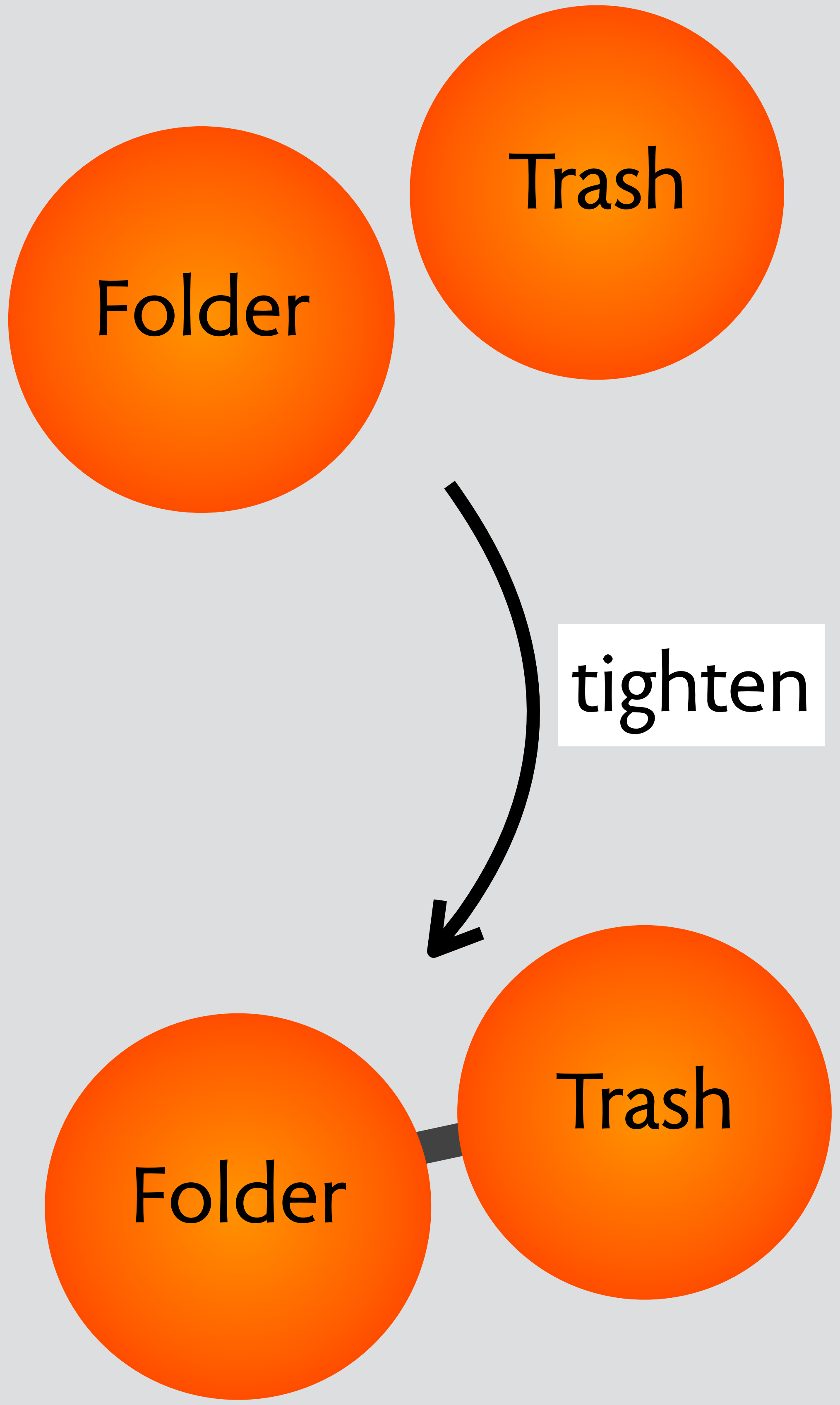
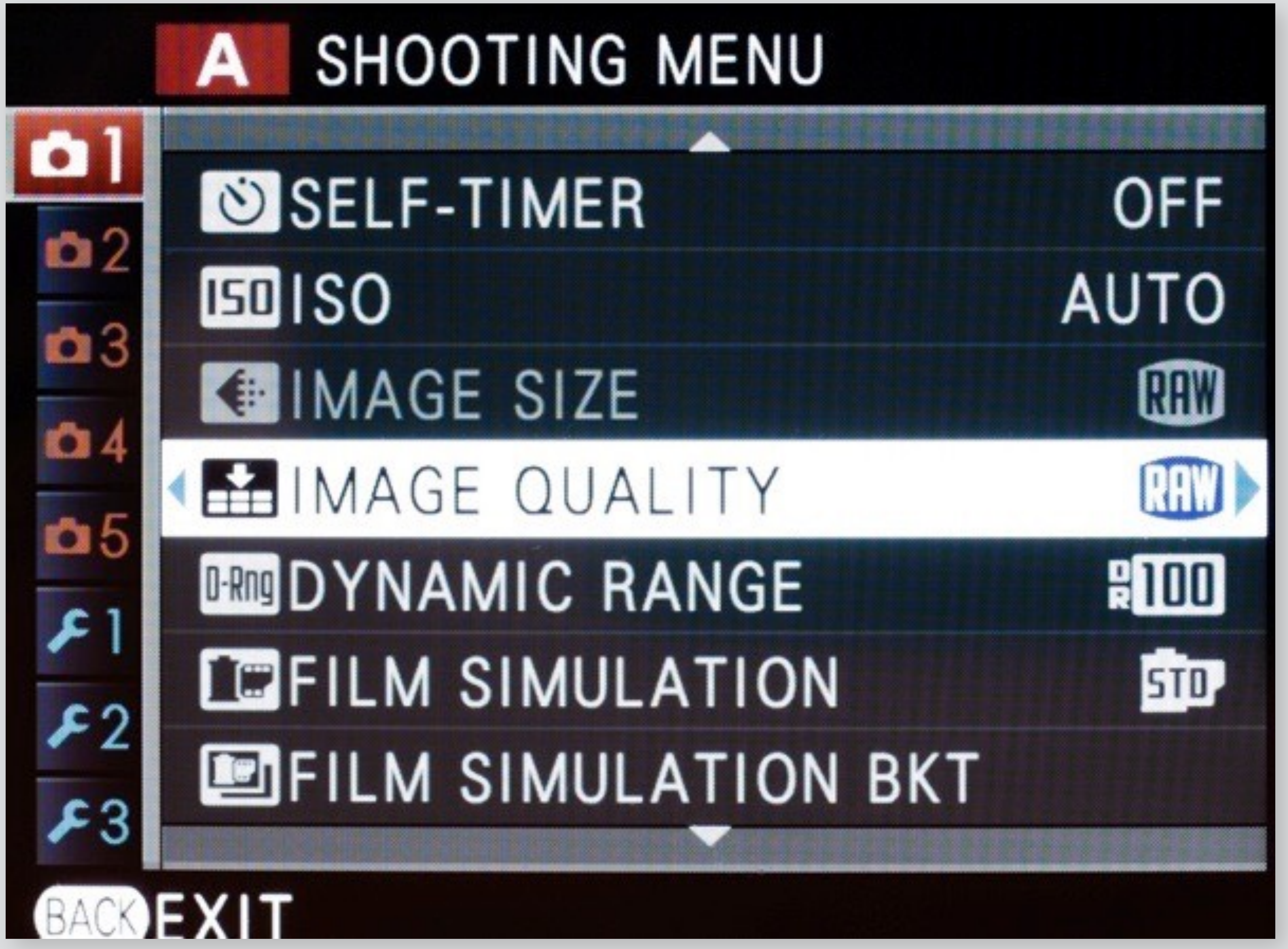


design moves
in response to
problems

aspect ratio in fujifilm cameras

a lovely camera fuji x100

complex menu system: image quality setting



A SHOOTING MENU

SELF-TIMER OFF

ISO AUTO

IMAGE SIZE RAW

IMAGE QUALITY RAW

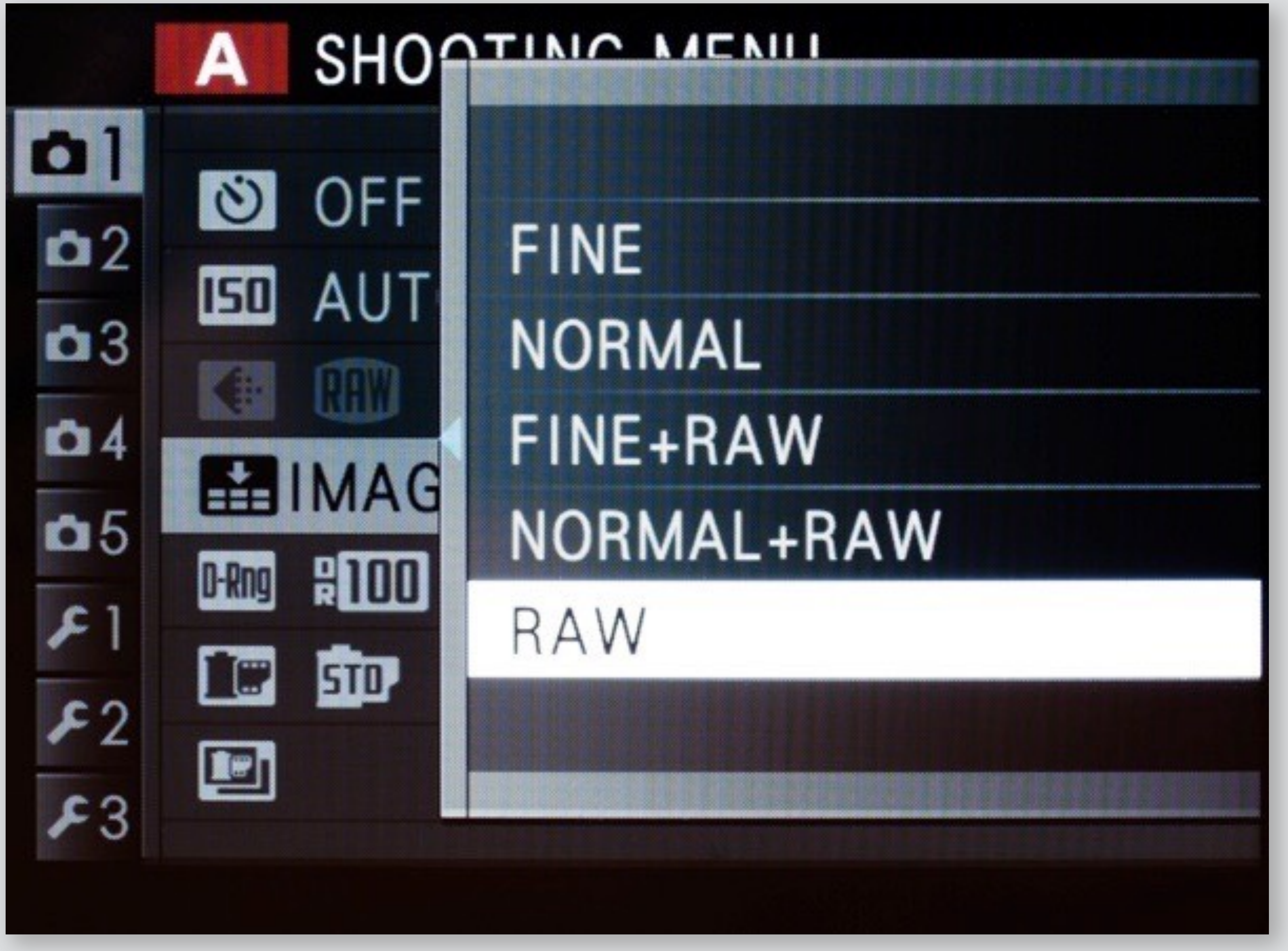
DYNAMIC RANGE DR100

FILM SIMULATION STD

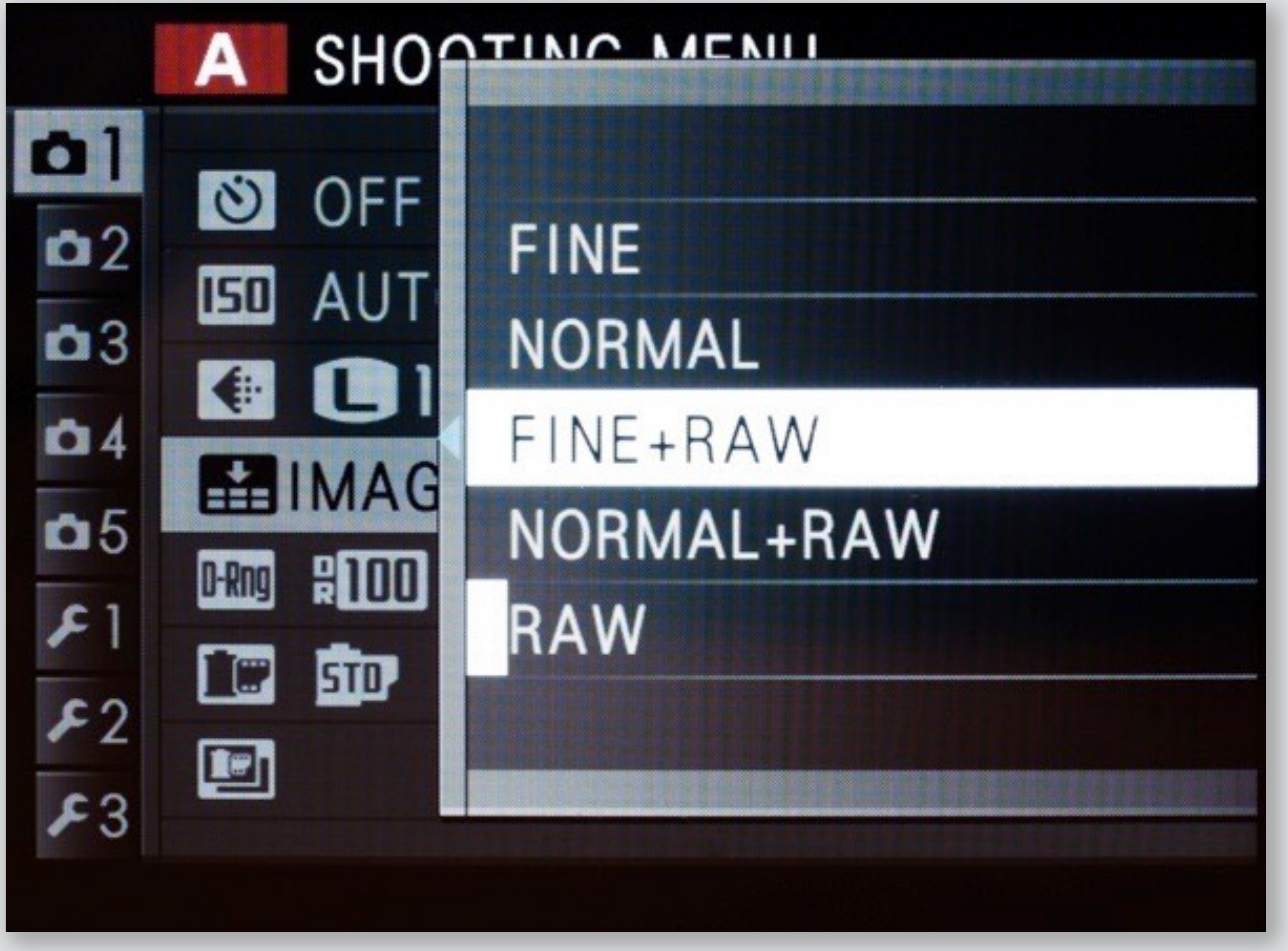
FILM SIMULATION BKT

BACK EXIT

complex menu system: image quality setting



complex menu system: image quality setting



aspect ratio

aspect ratio

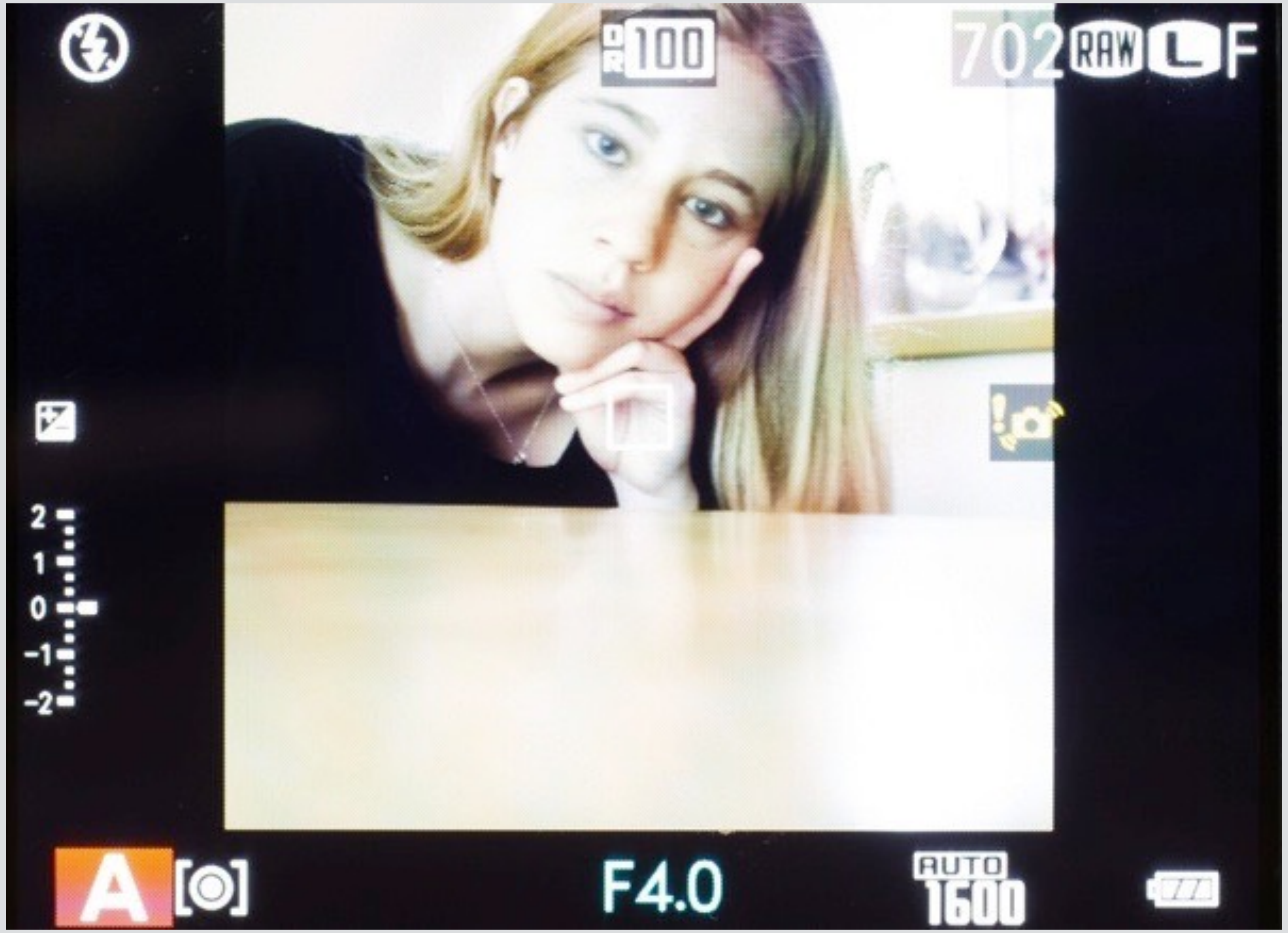
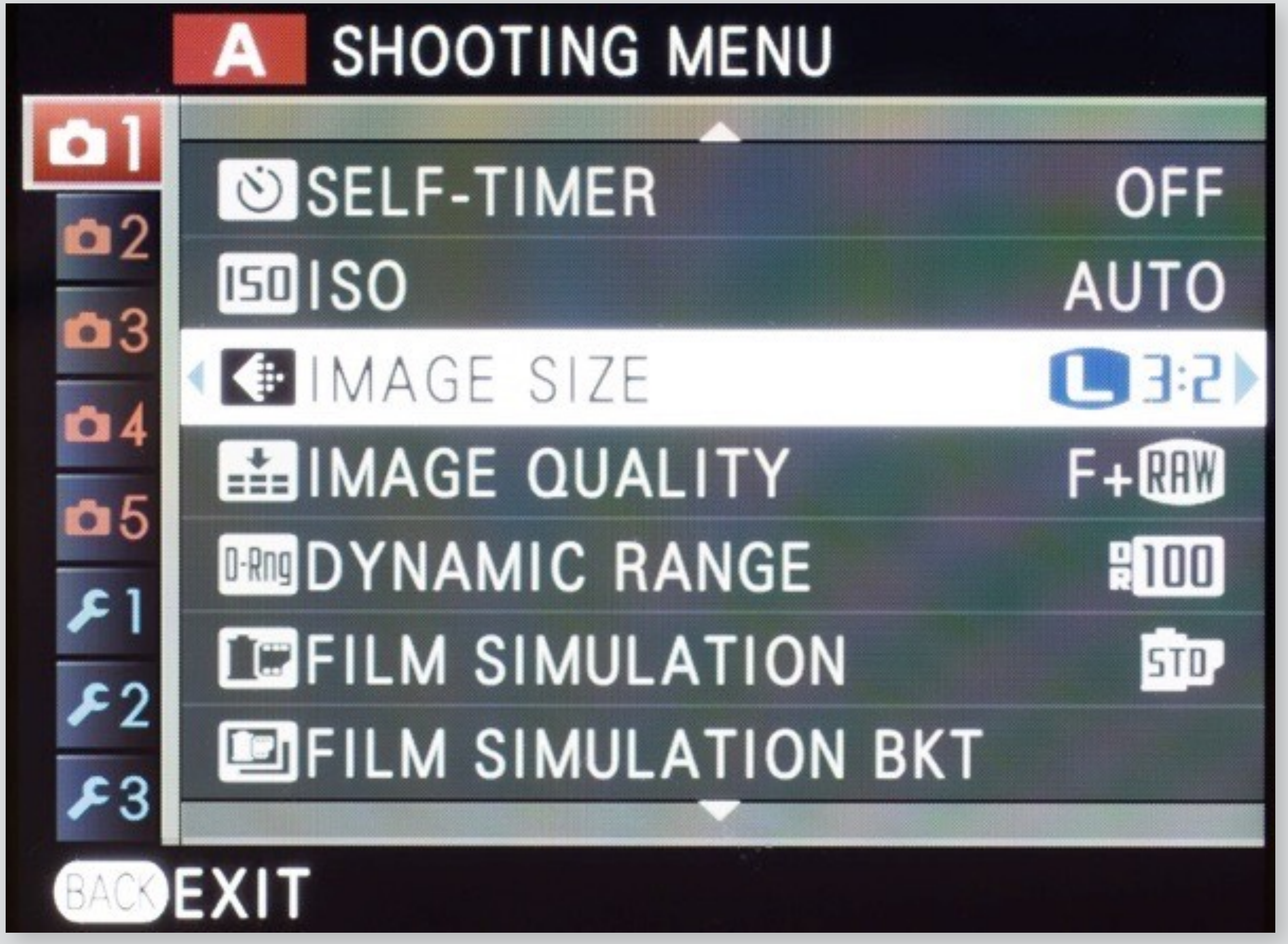


image size setting



A SHOOTING MENU

SELF-TIMER OFF

ISO AUTO

IMAGE SIZE L 3:2

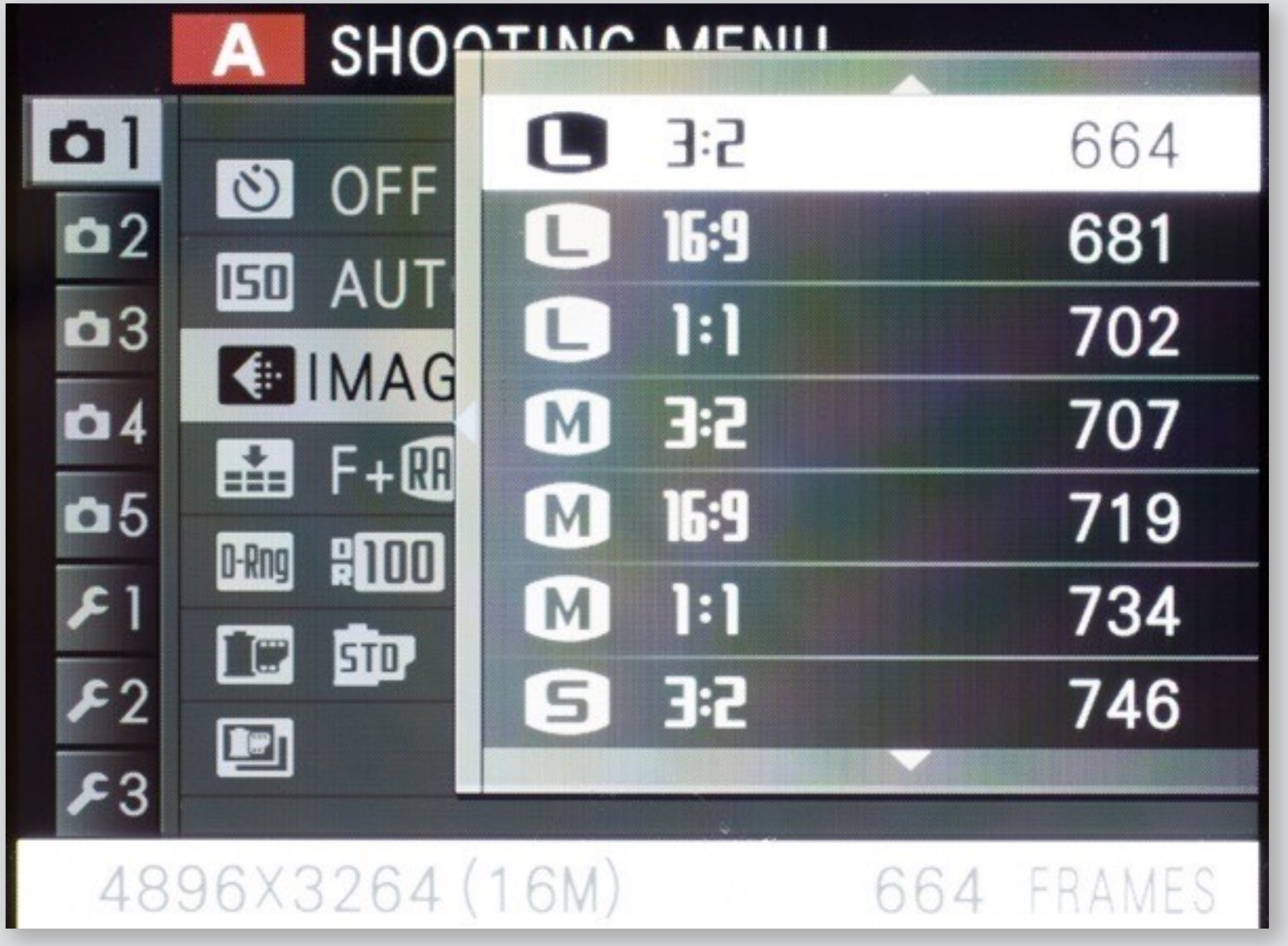
IMAGE QUALITY F+RAW

DYNAMIC RANGE DR100

FILM SIMULATION STD

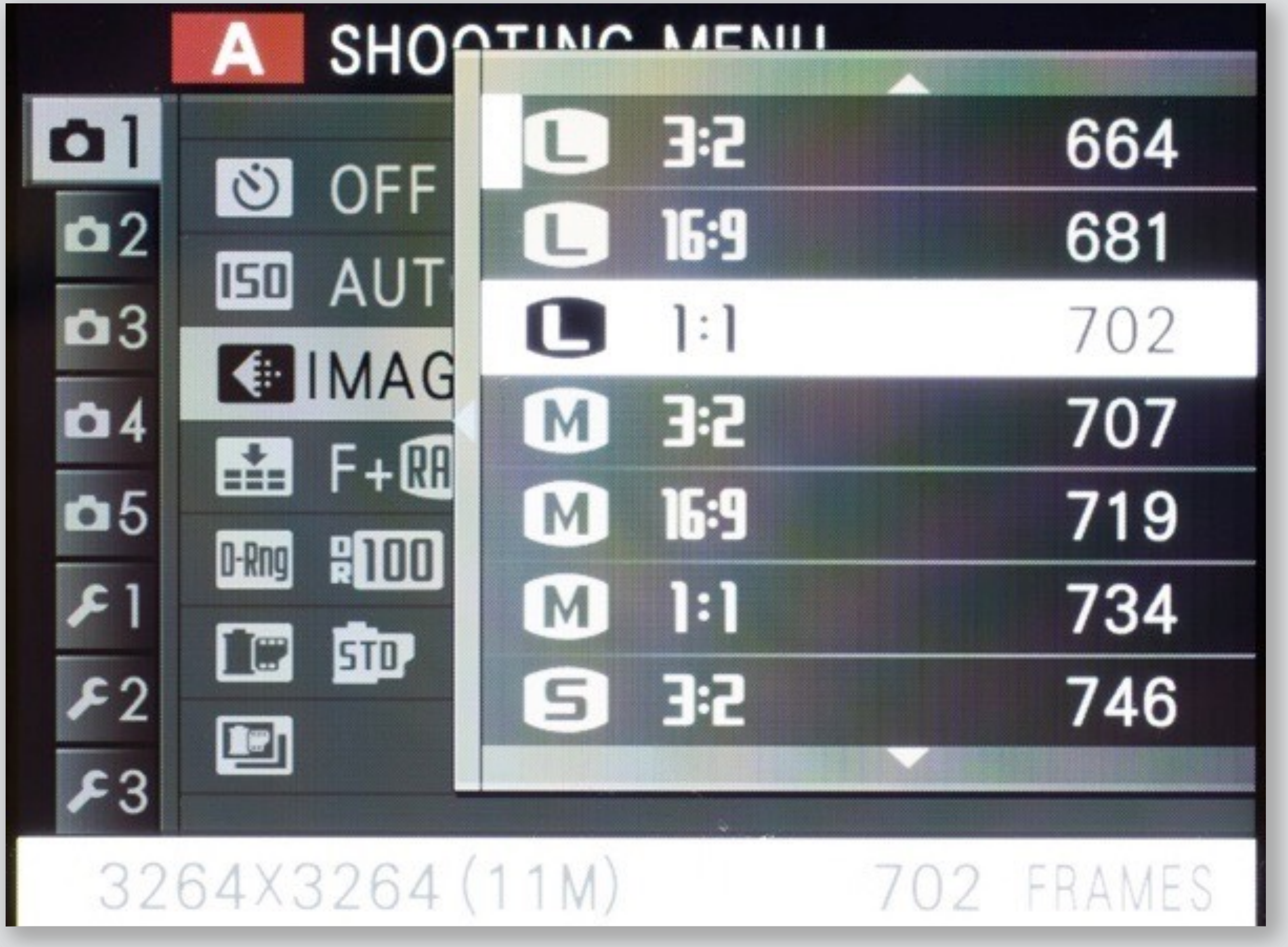
FILM SIMULATION BKT

image size setting



4896X3264 (16M) 664 FRAMES

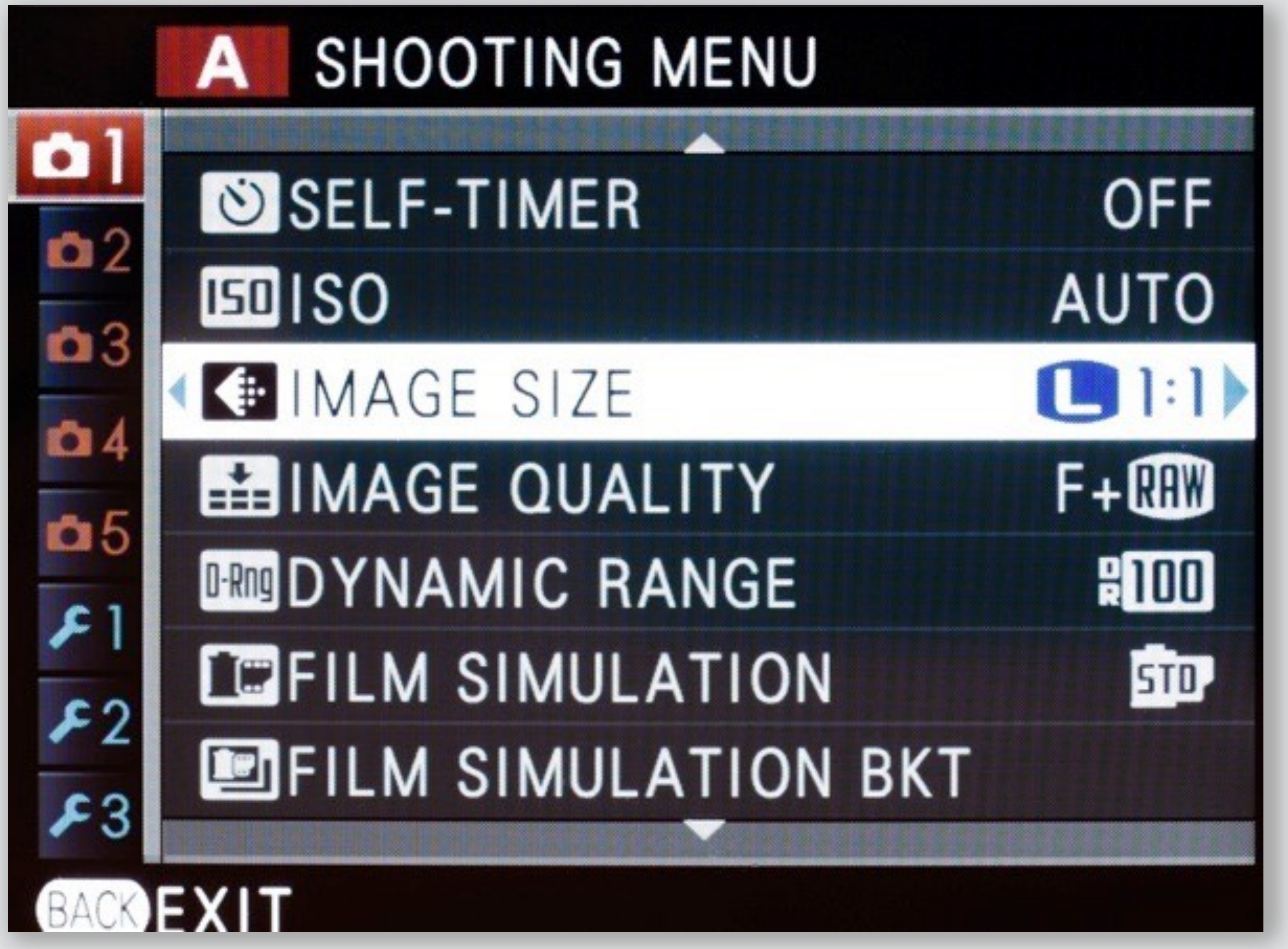
image size setting



L	3:2	664
L	16:9	681
L	1:1	702
M	3:2	707
M	16:9	719
M	1:1	734
S	3:2	746

3264X3264 (11M) 702 FRAMES

image size setting

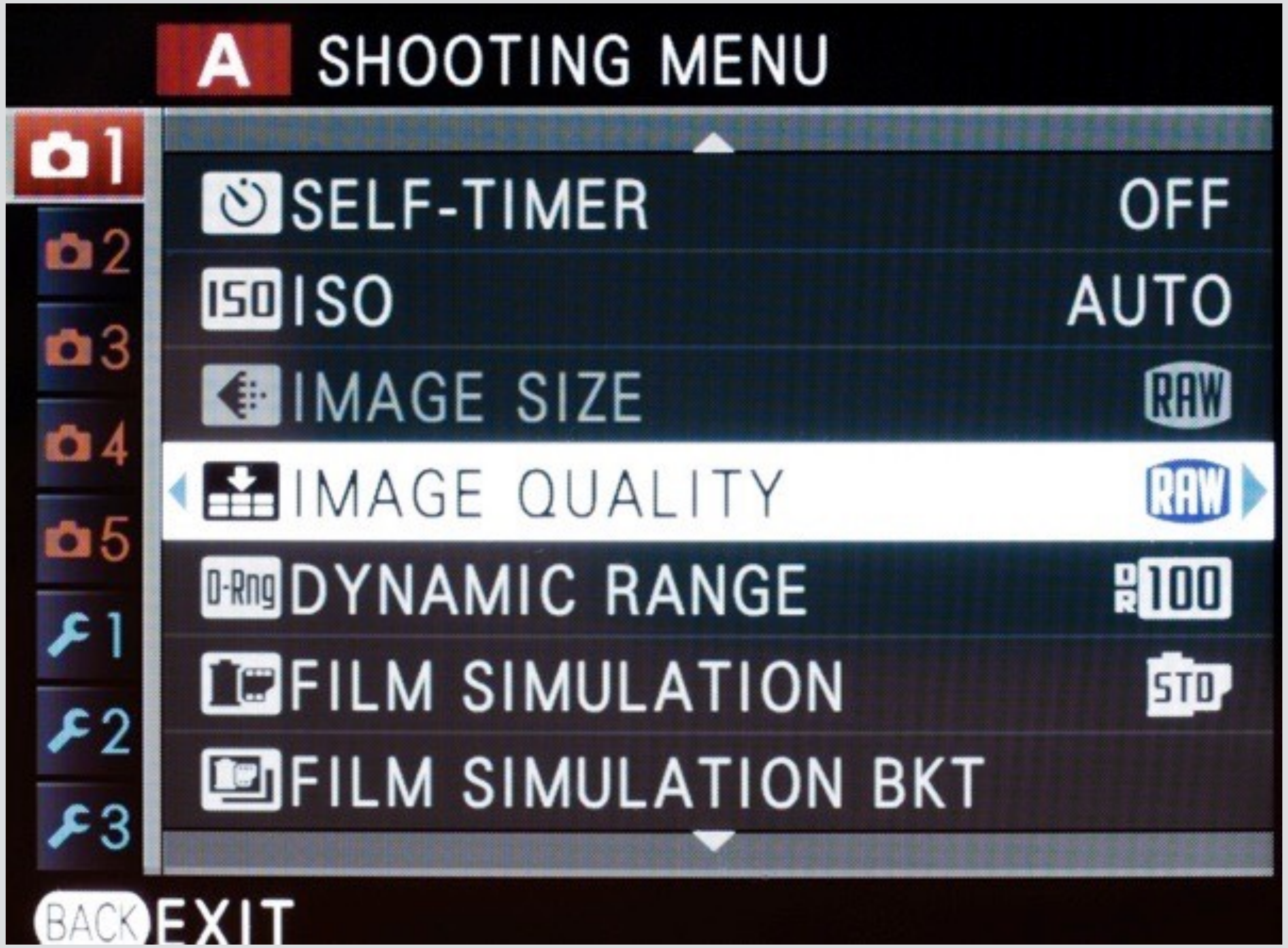


A SHOOTING MENU

SELF-TIMER	OFF
ISO	AUTO
IMAGE SIZE	L 1:1
IMAGE QUALITY	F+RAW
DYNAMIC RANGE	DR100
FILM SIMULATION	STD
FILM SIMULATION BKT	

BACK EXIT

non-standard ratio + raw?



A SHOOTING MENU

SELF-TIMER OFF

ISO AUTO

IMAGE SIZE RAW

IMAGE QUALITY RAW

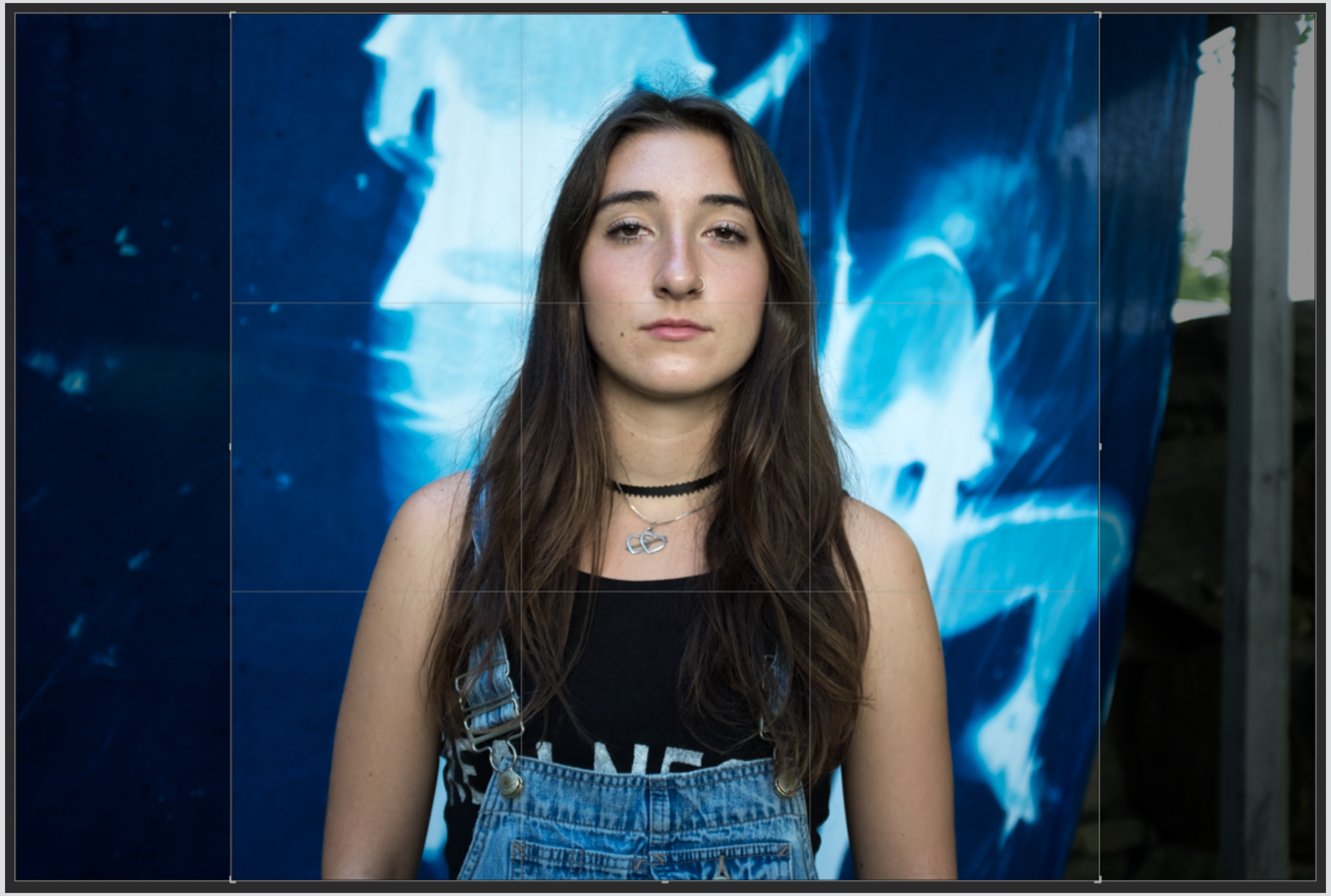
DYNAMIC RANGE DR100

FILM SIMULATION STD

FILM SIMULATION BKT

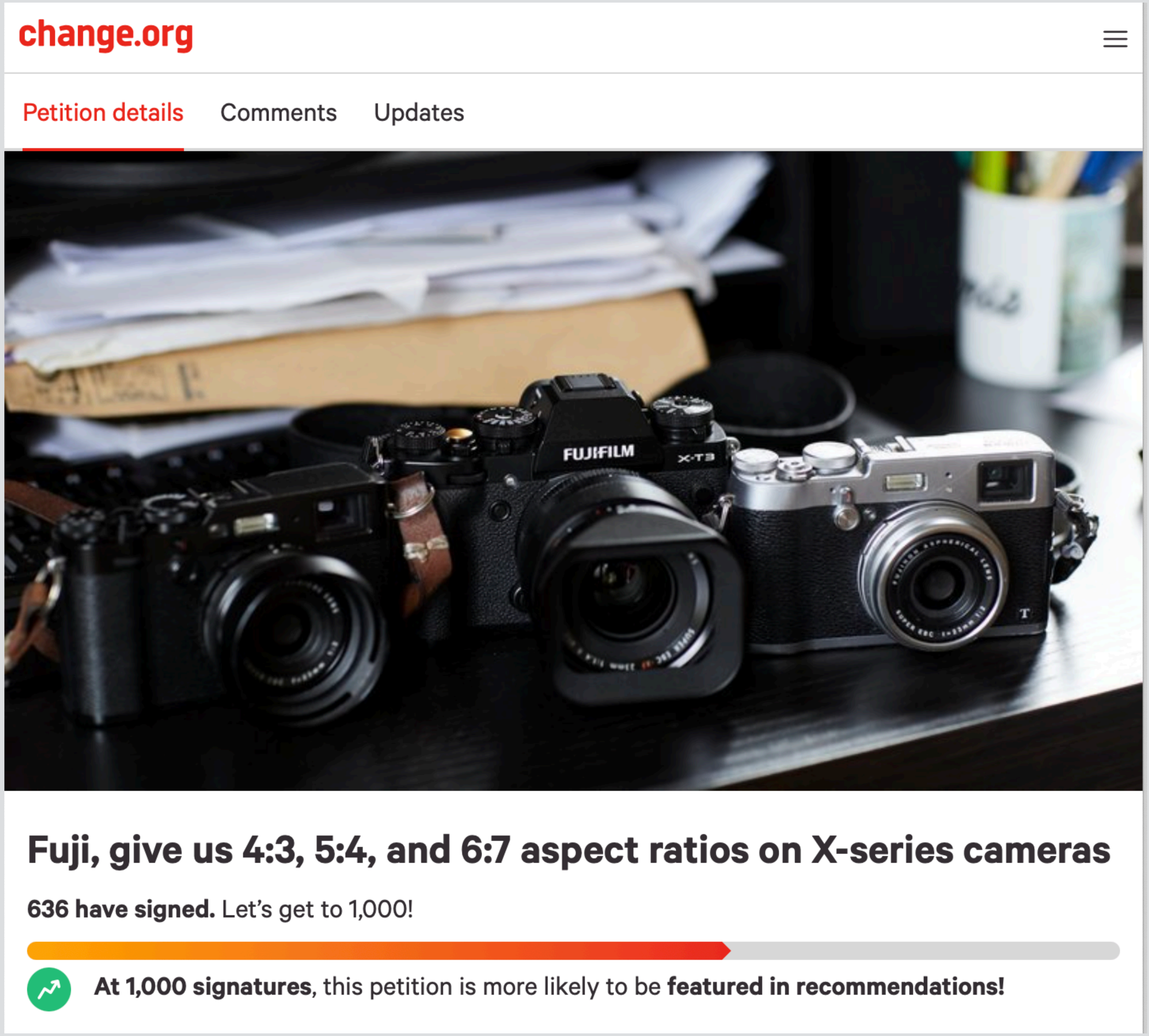
BACK EXIT

problem #1: no non-standard ratio unless also save JPG!



raw image showing non-destructive aspect ratio crop

problem #2: very few ratio options

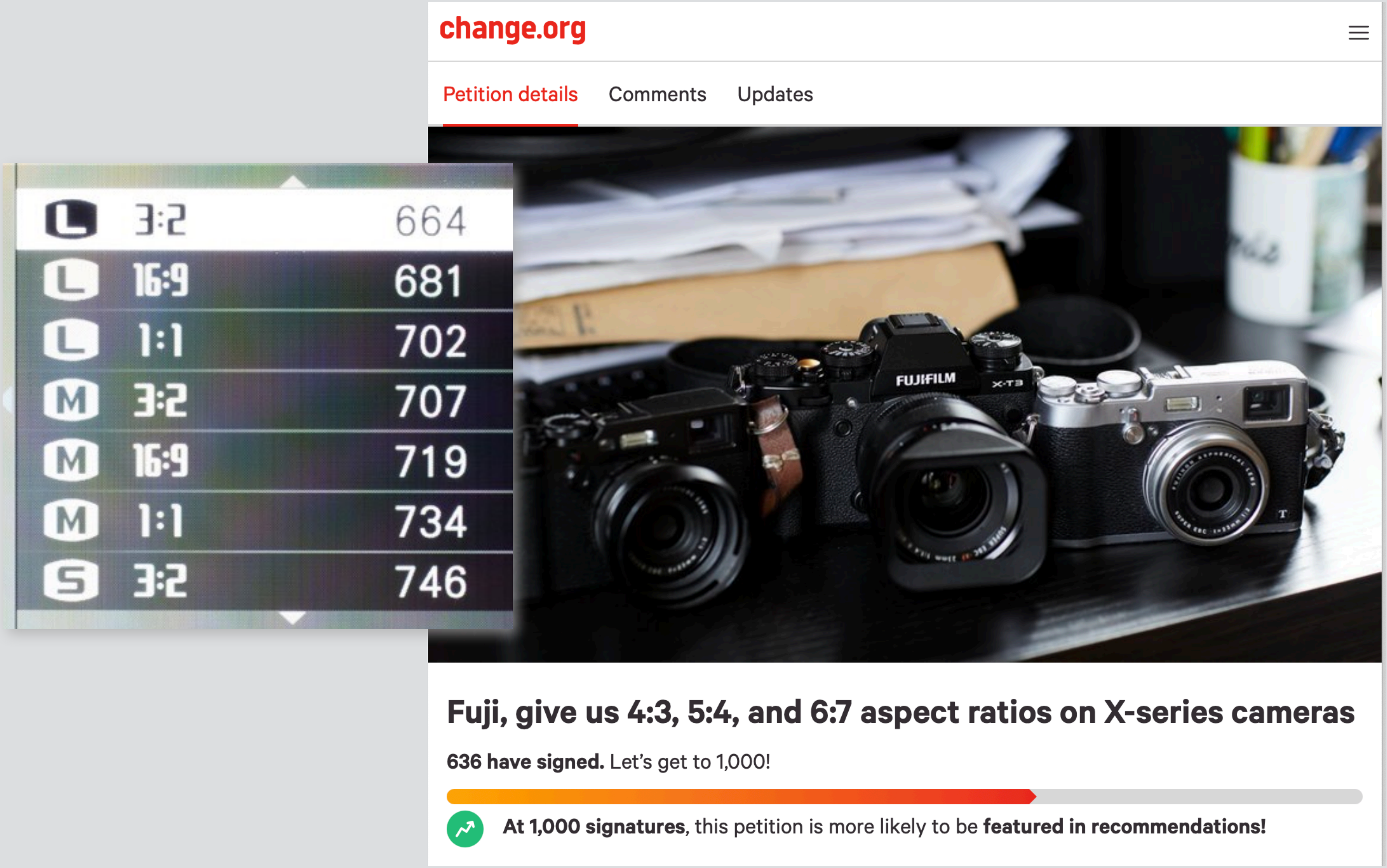


Fuji, give us 4:3, 5:4, and 6:7 aspect ratios on X-series cameras

636 have signed. Let’s get to 1,000!

At 1,000 signatures, this petition is more likely to be **featured in recommendations!**

problem #2: very few ratio options



L	3:2	664
L	16:9	681
L	1:1	702
M	3:2	707
M	16:9	719
M	1:1	734
S	3:2	746

change.org

Petition details Comments Updates

Fuji, give us 4:3, 5:4, and 6:7 aspect ratios on X-series cameras

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diagnosis?

aspect ratio is not a concept
merged into JPEG image size concept
so cannot be controlled independently
I call this ”overloading by piggybacking”

solution: split concepts
would allow ratio change to raws without JPEGs
would avoid combinatoric explosion of options

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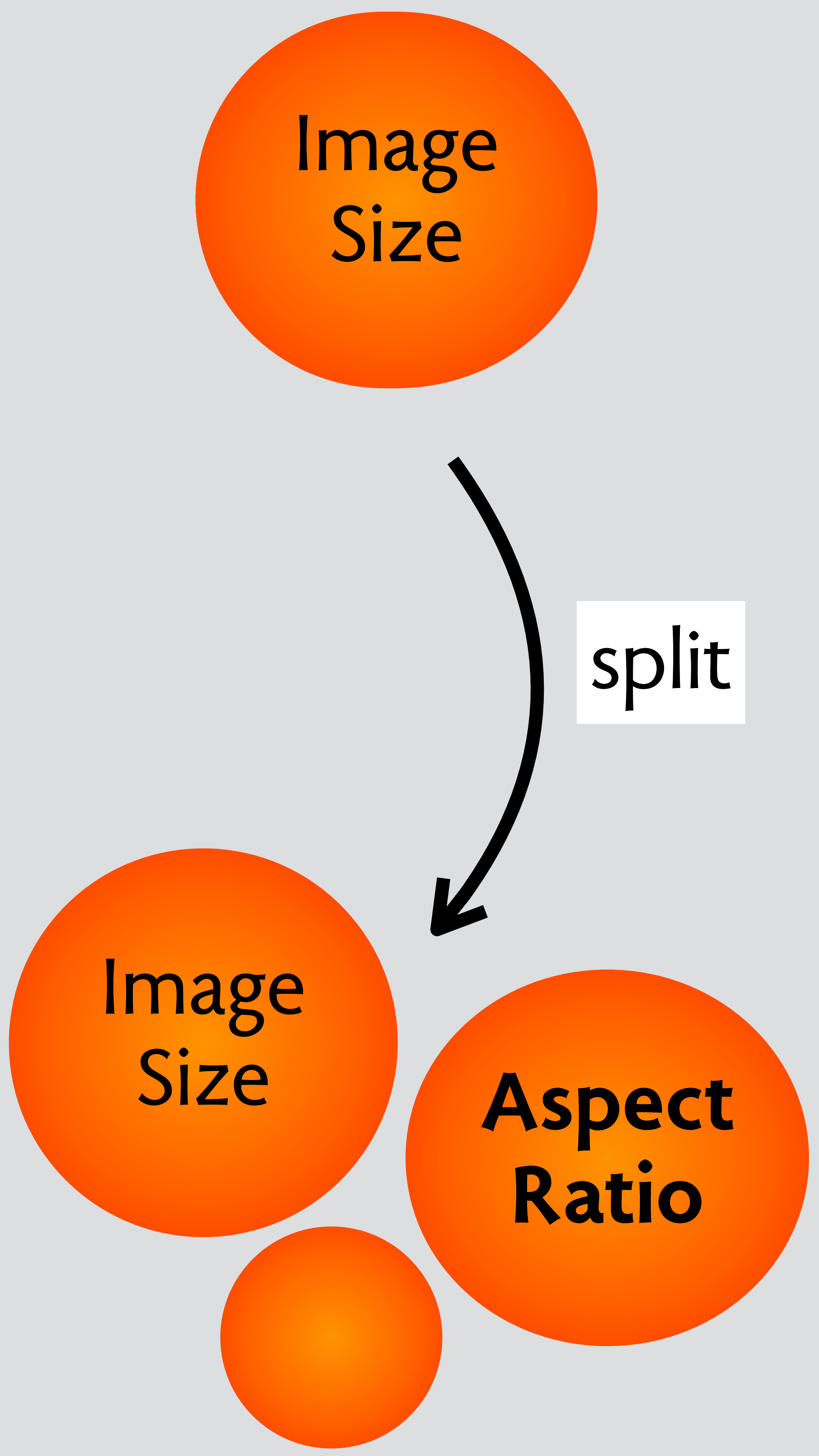
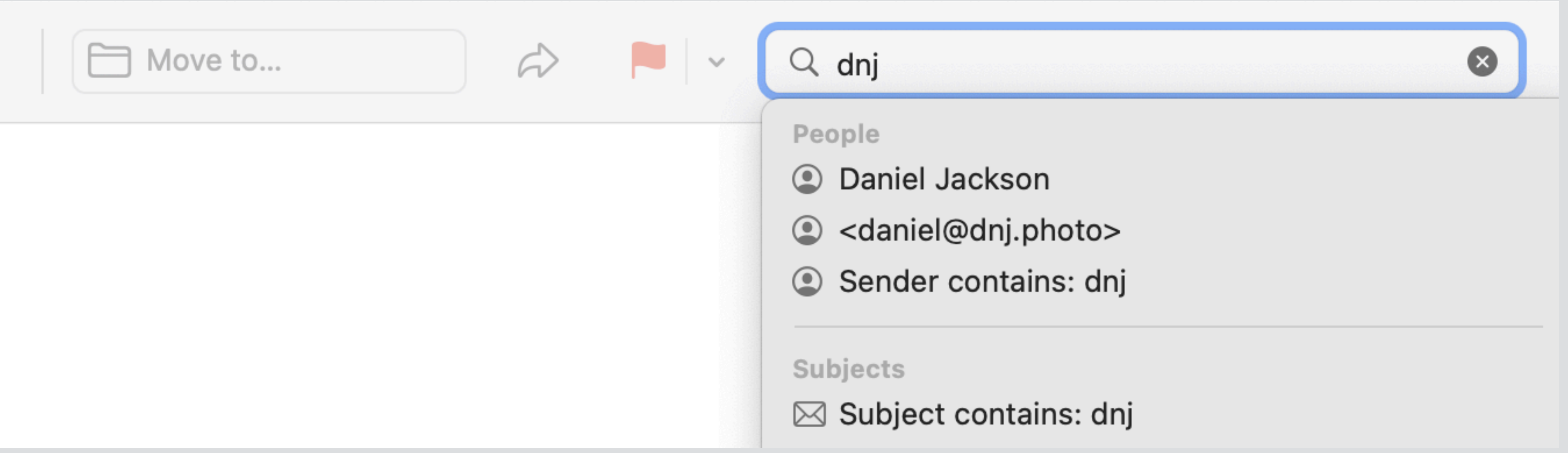


message filters

in apple mail

how many ways to filter messages?

how many ways to filter messages?



dnj

People

Daniel Jackson

<daniel@dnj.photo>

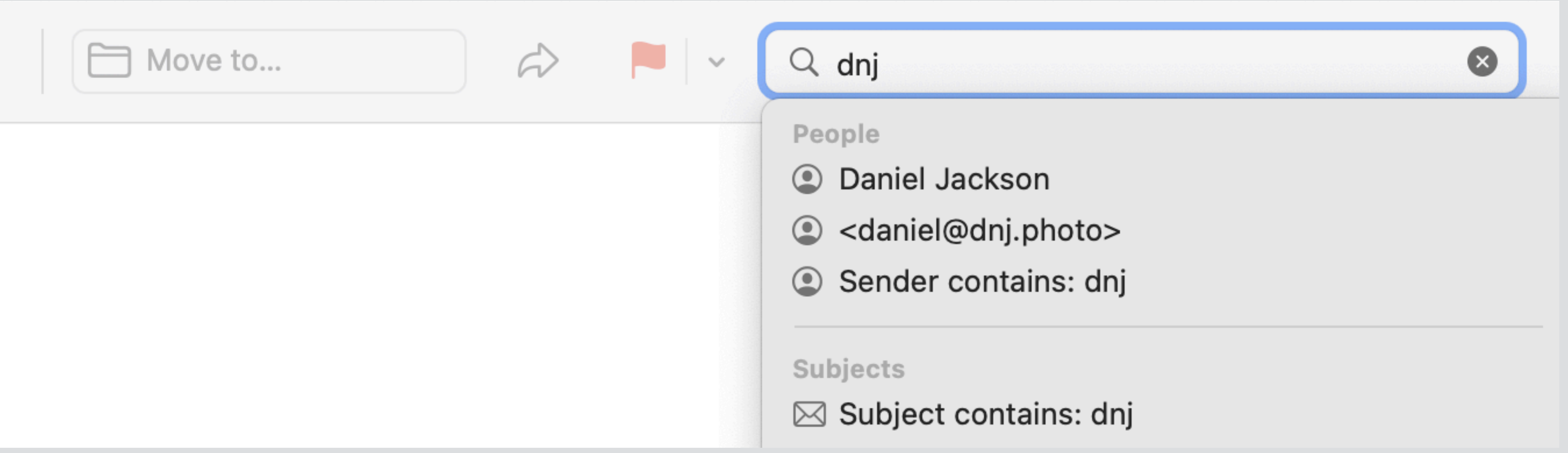
Sender contains: dnj

Subjects

Subject contains: dnj

search for a message

how many ways to filter messages?



dnj

People

Daniel Jackson

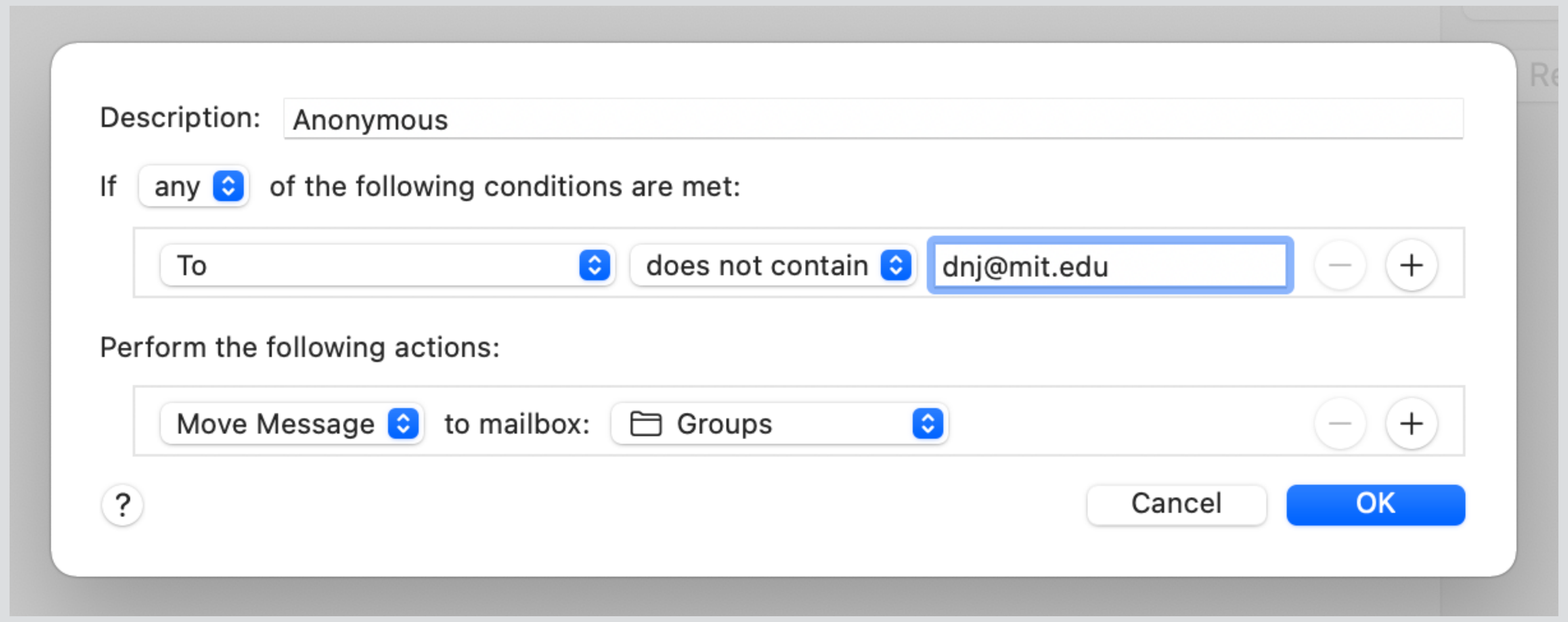
<daniel@dnj.photo>

Sender contains: dnj

Subjects

Subject contains: dnj

search for a message


Description: Anonymous

If any of the following conditions are met:

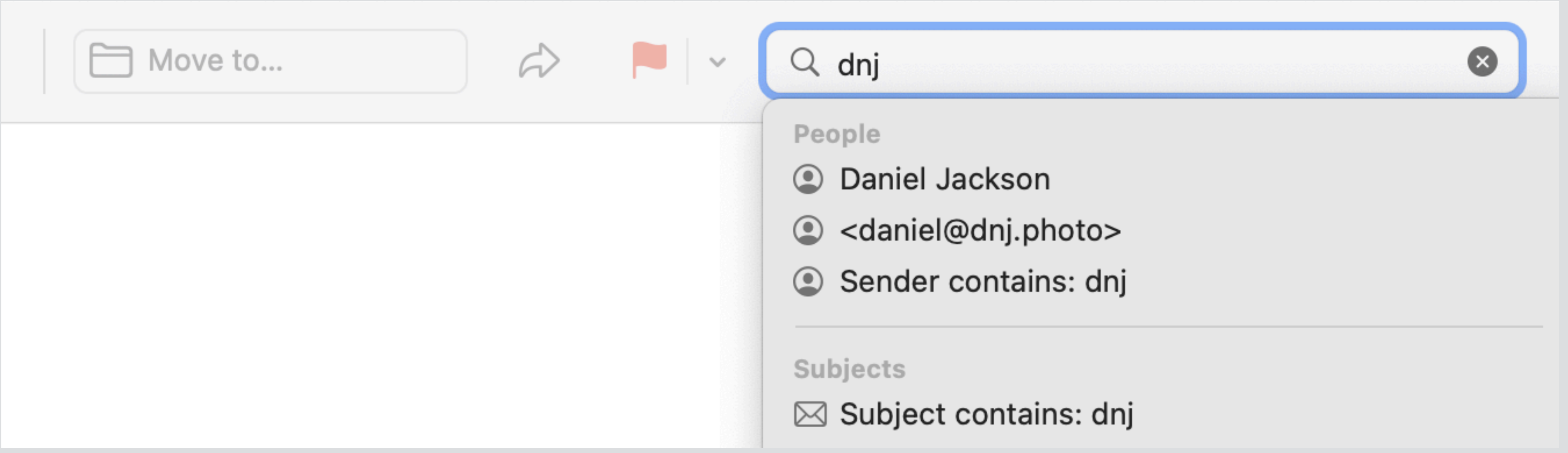
To does not contain dnj@mit.edu

Perform the following actions:

Move Message to mailbox: Groups

create a rule

how many ways to filter messages?



dnj

People

Daniel Jackson

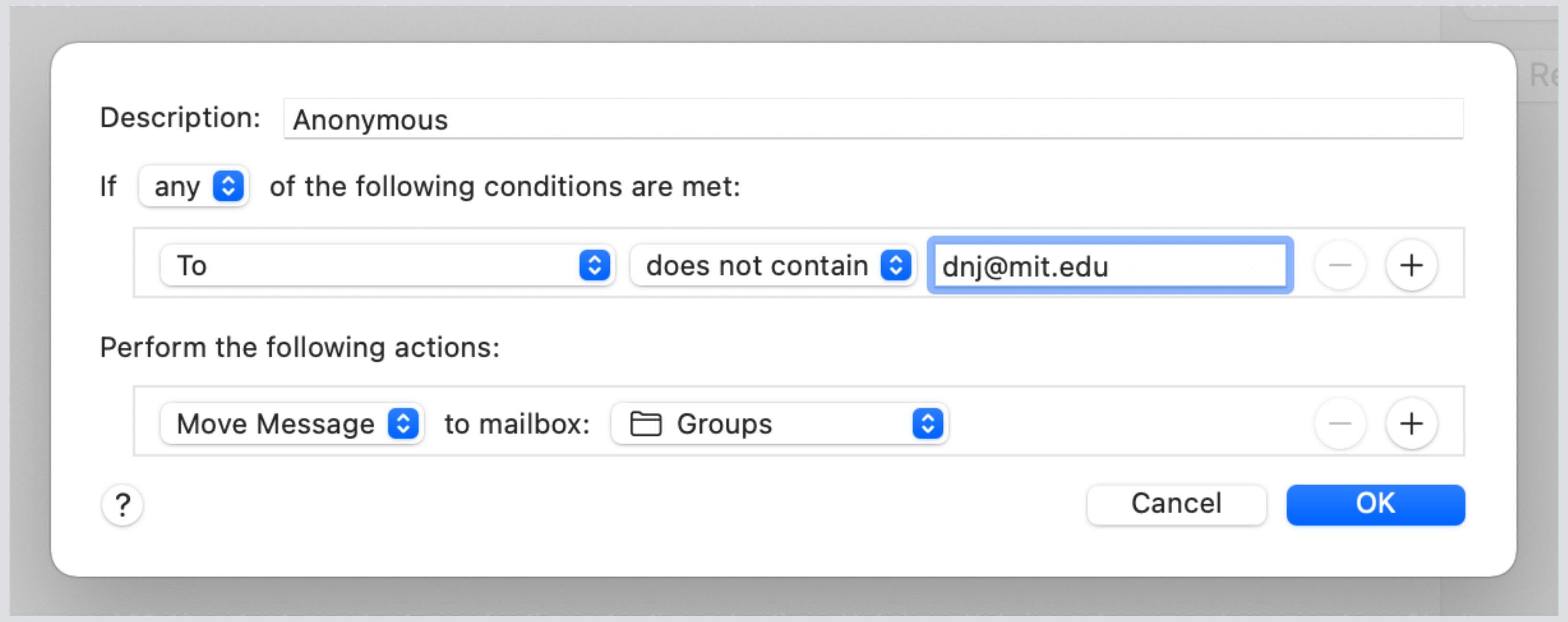
<daniel@dnj.photo>

Sender contains: dnj

Subjects

Subject contains: dnj

search for a message



Description: Anonymous

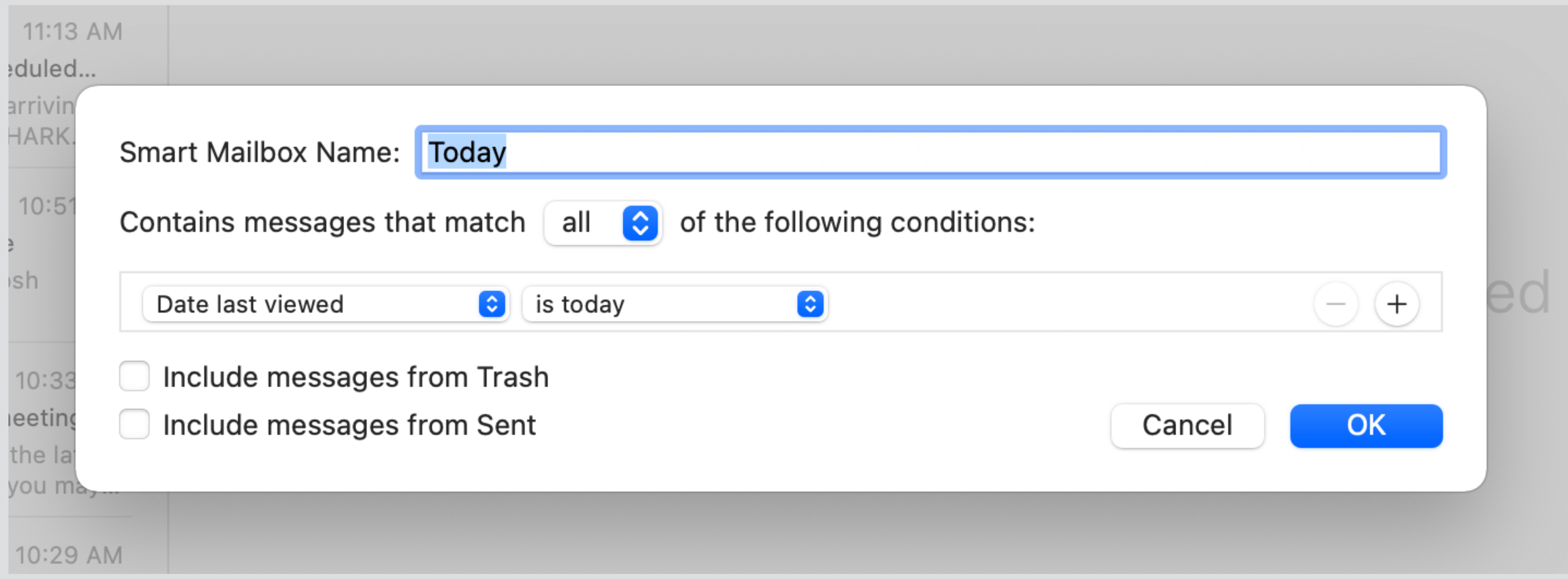
If any of the following conditions are met:

To does not contain dnj@mit.edu

Perform the following actions:

Move Message to mailbox: Groups

create a rule



Smart Mailbox Name: Today

Contains messages that match all of the following conditions:

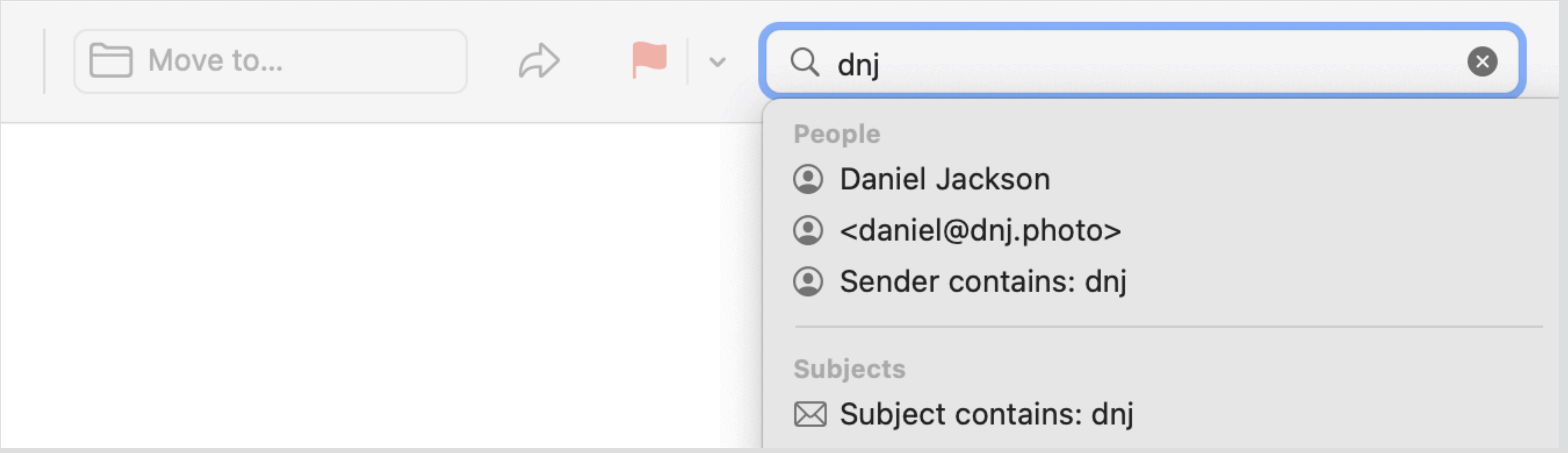
Date last viewed is today

□ Include messages from Trash

□ Include messages from Sent

define a smart folder

how many ways to filter messages?



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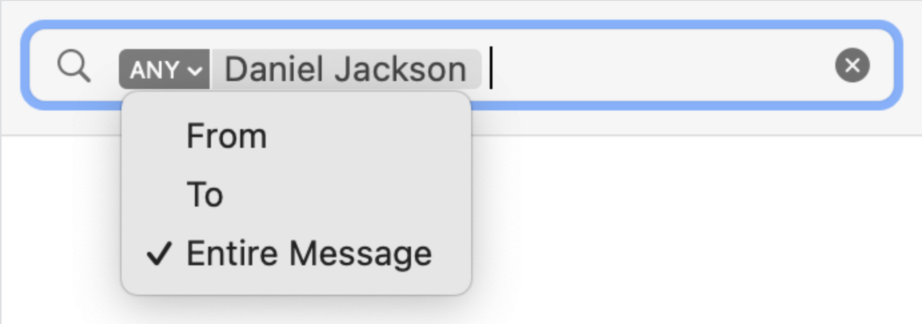
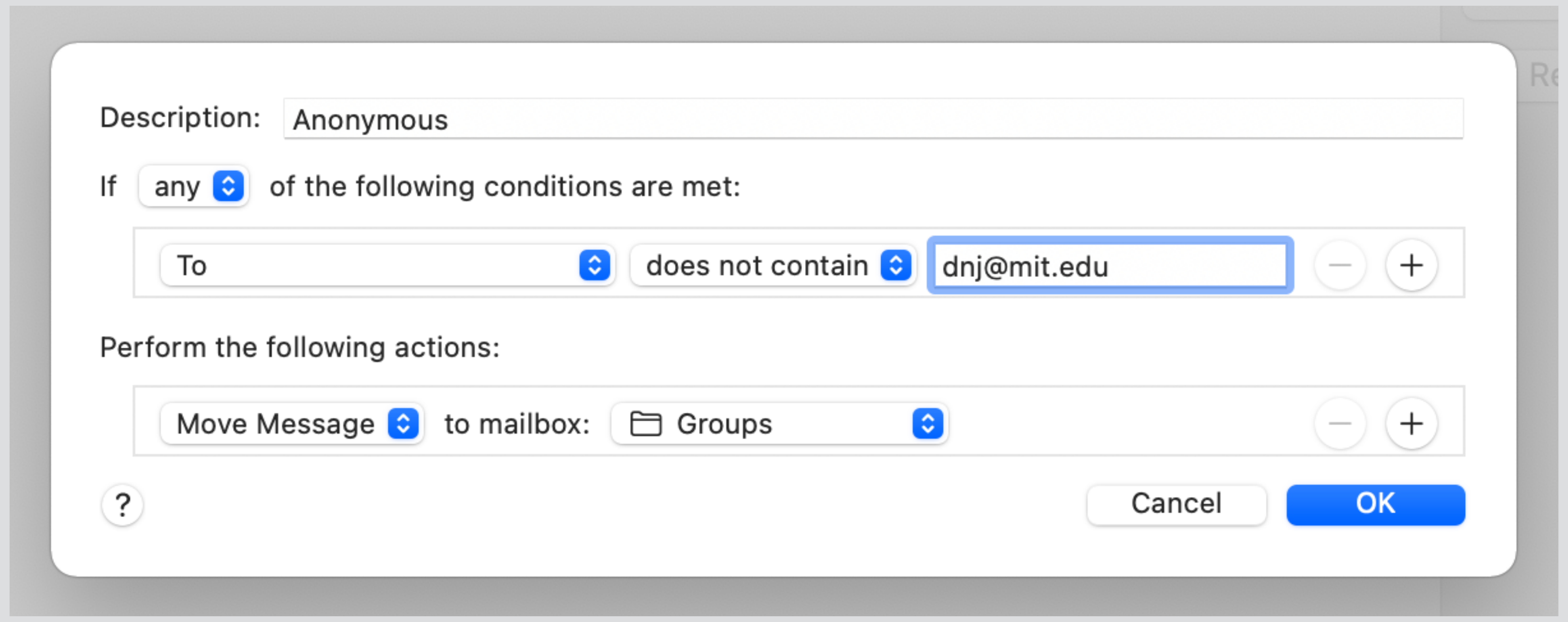

ANY Daniel Jackson

- From
- To
- ✓ Entire Message

search options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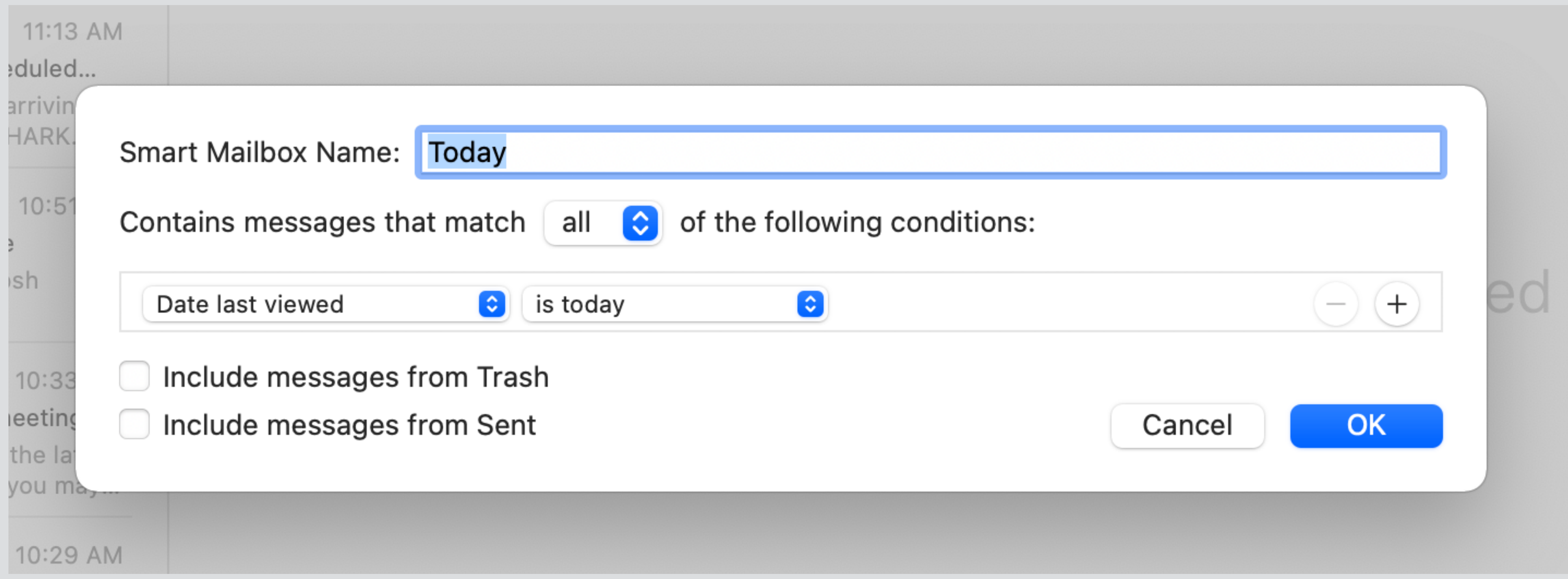
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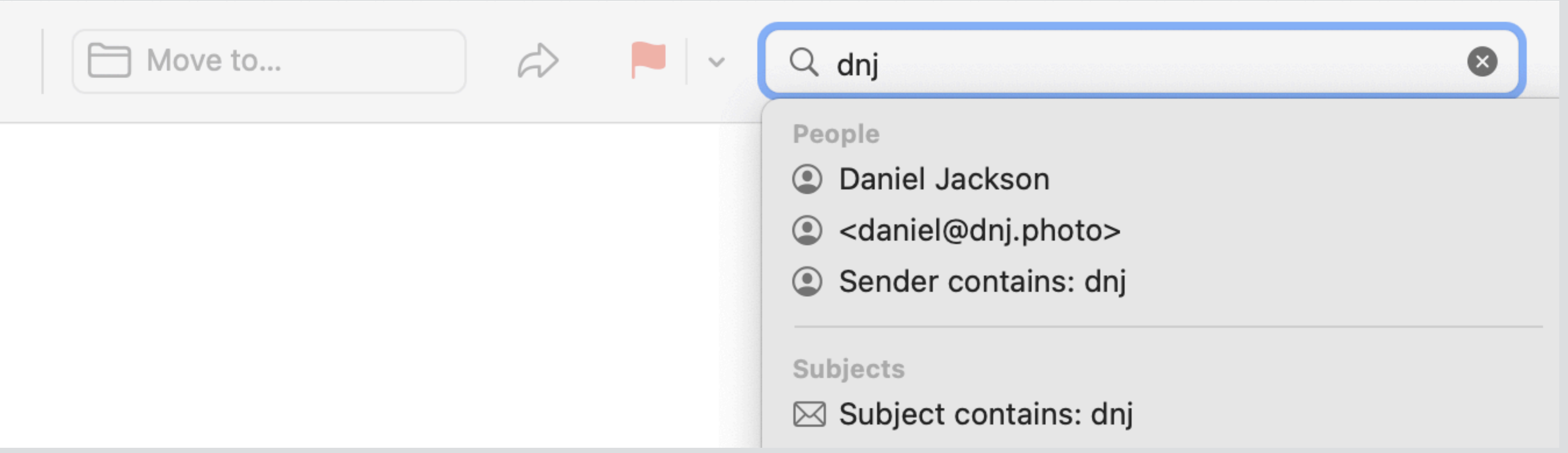
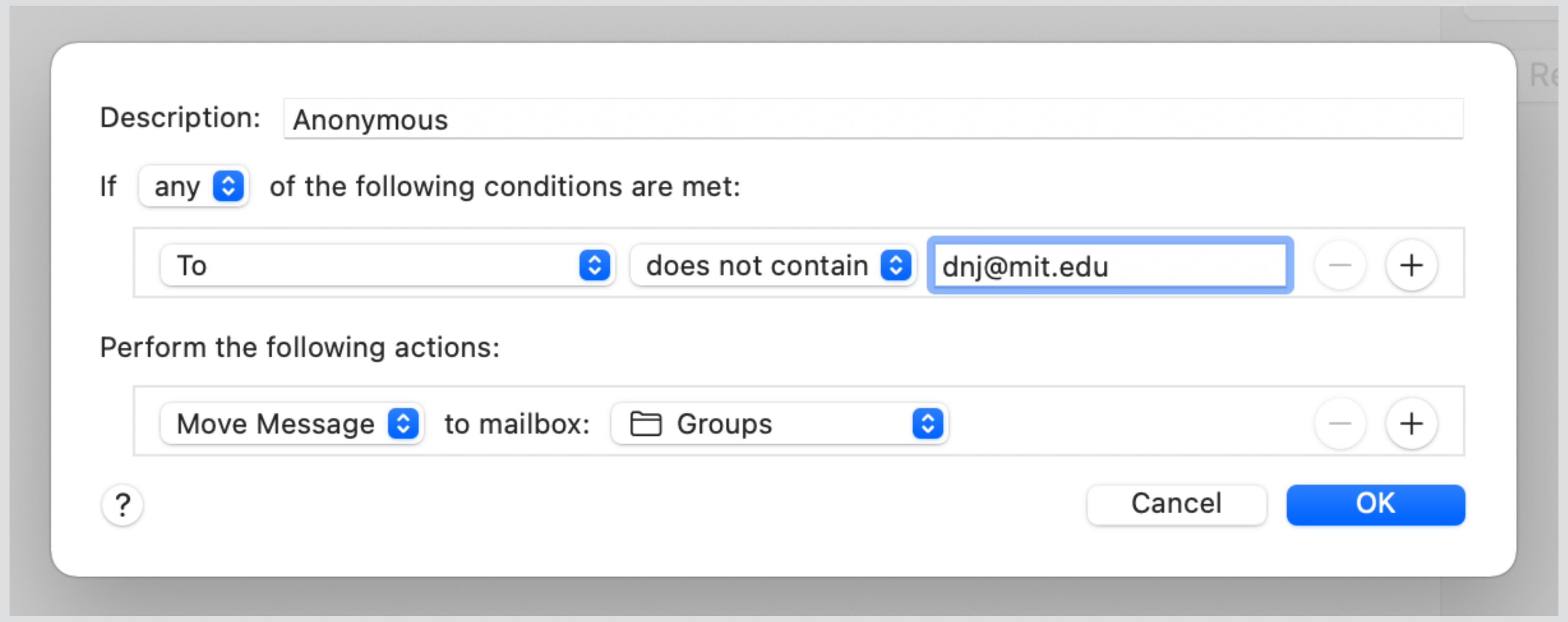


search for a message



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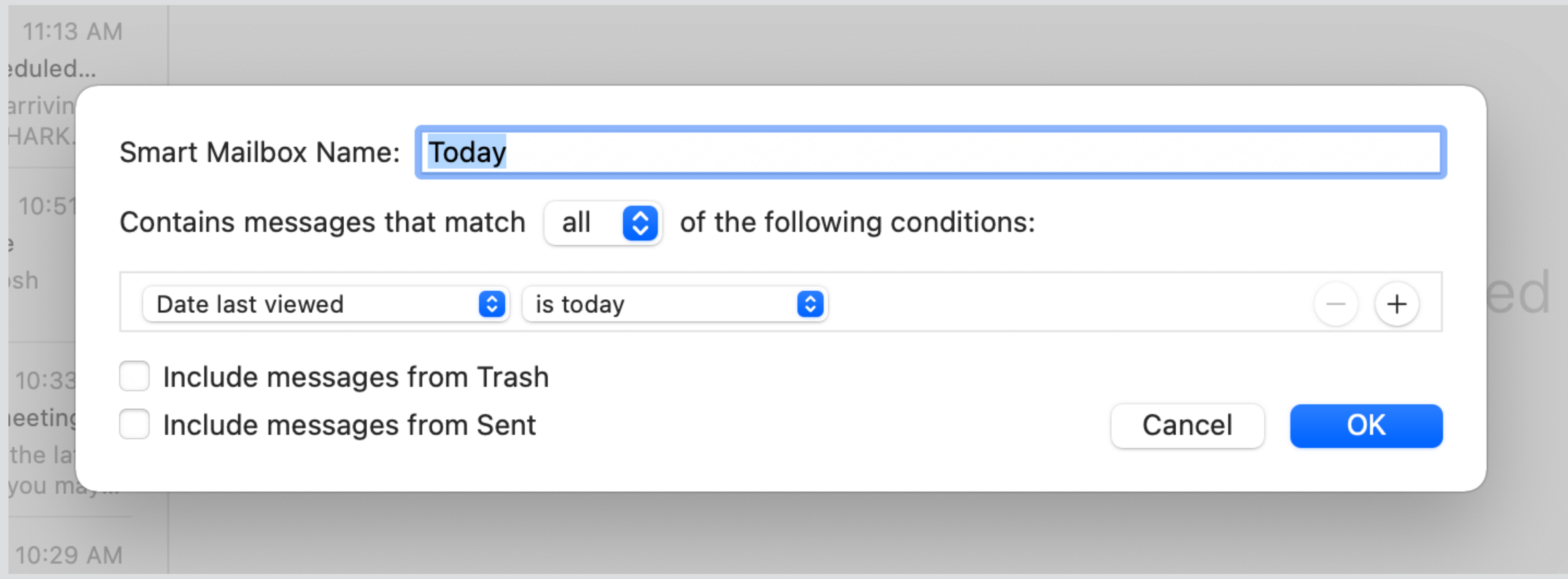

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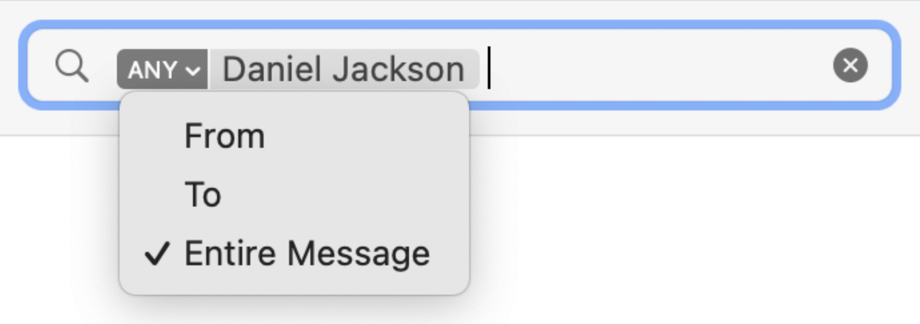
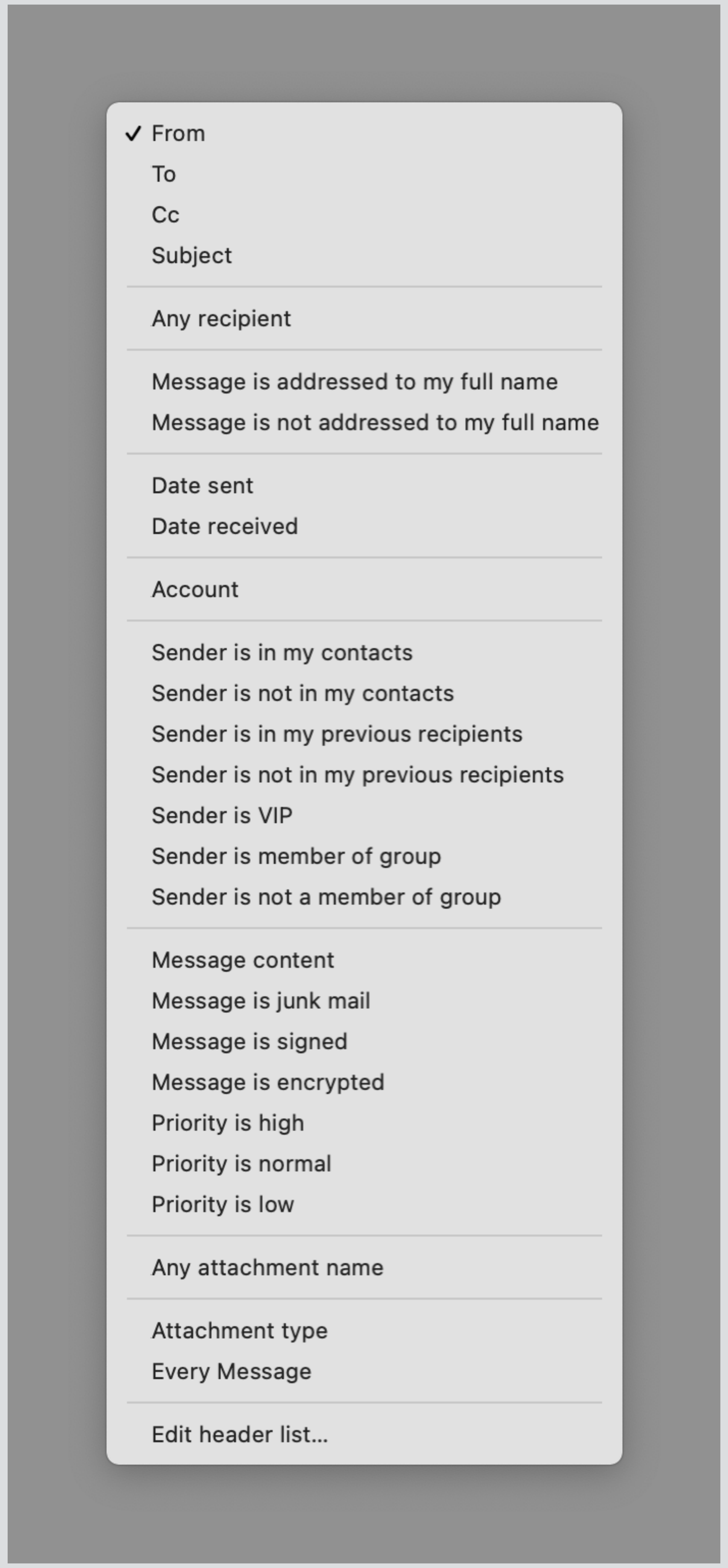


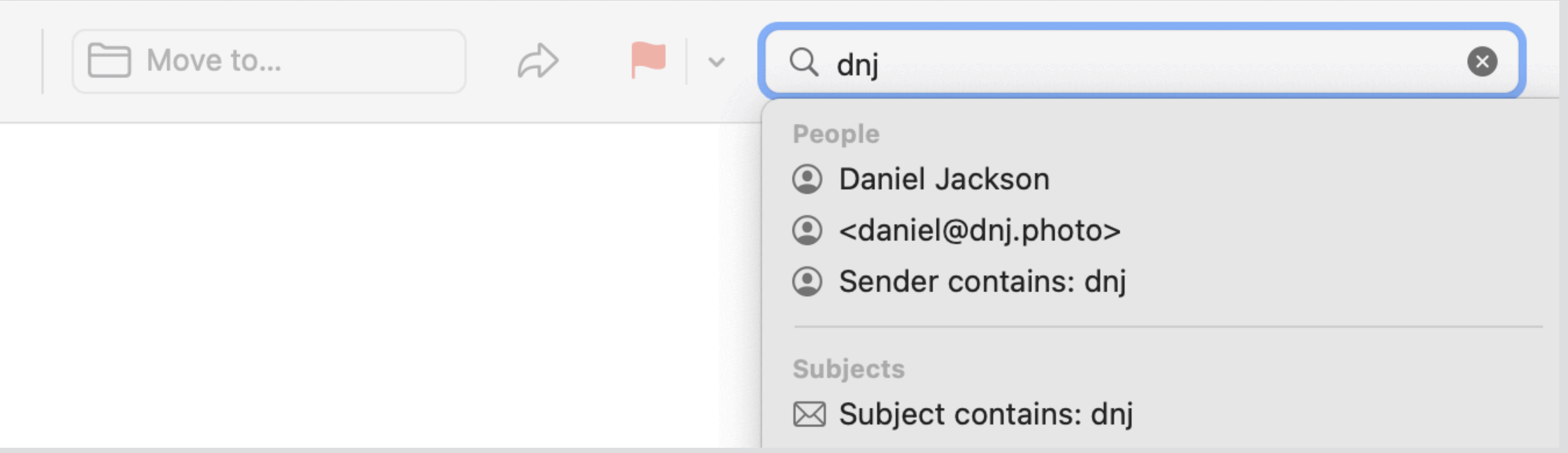
ANY Daniel Jackson

search options



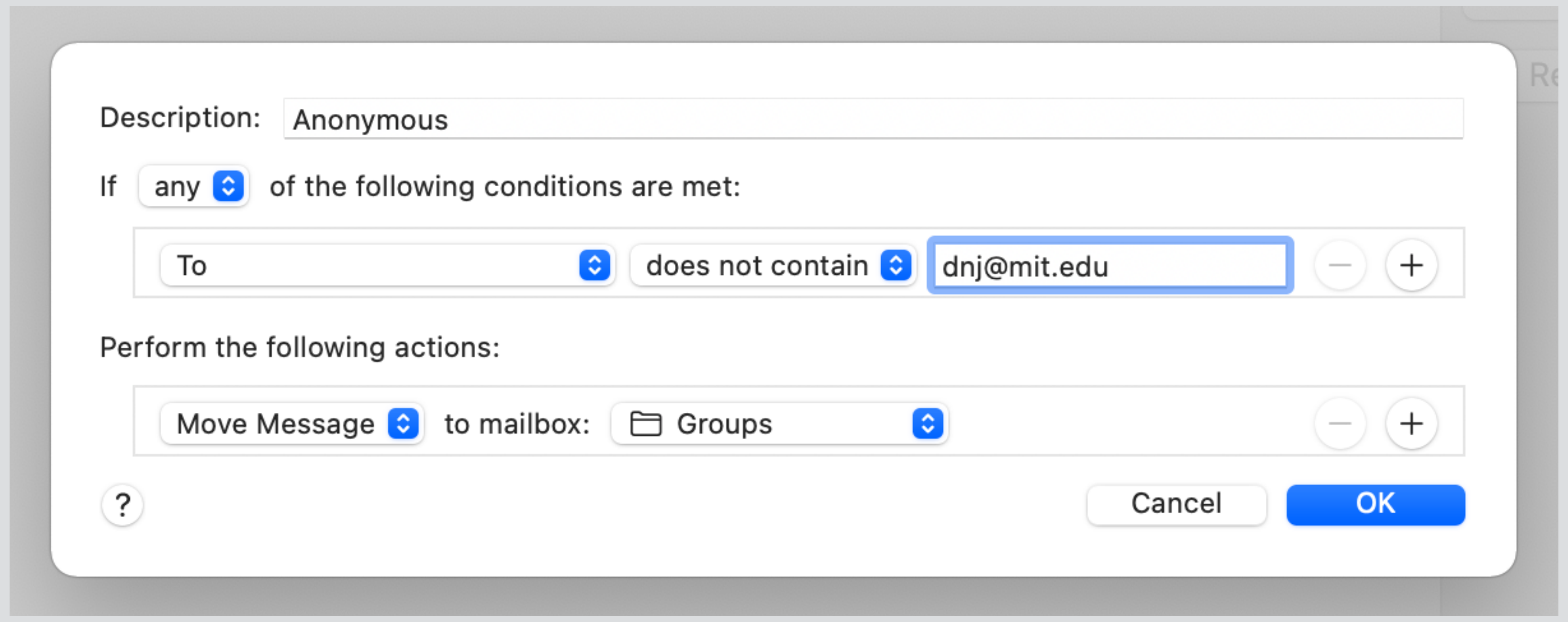
rule options

how many ways to filter messages?



dnj

search for a message



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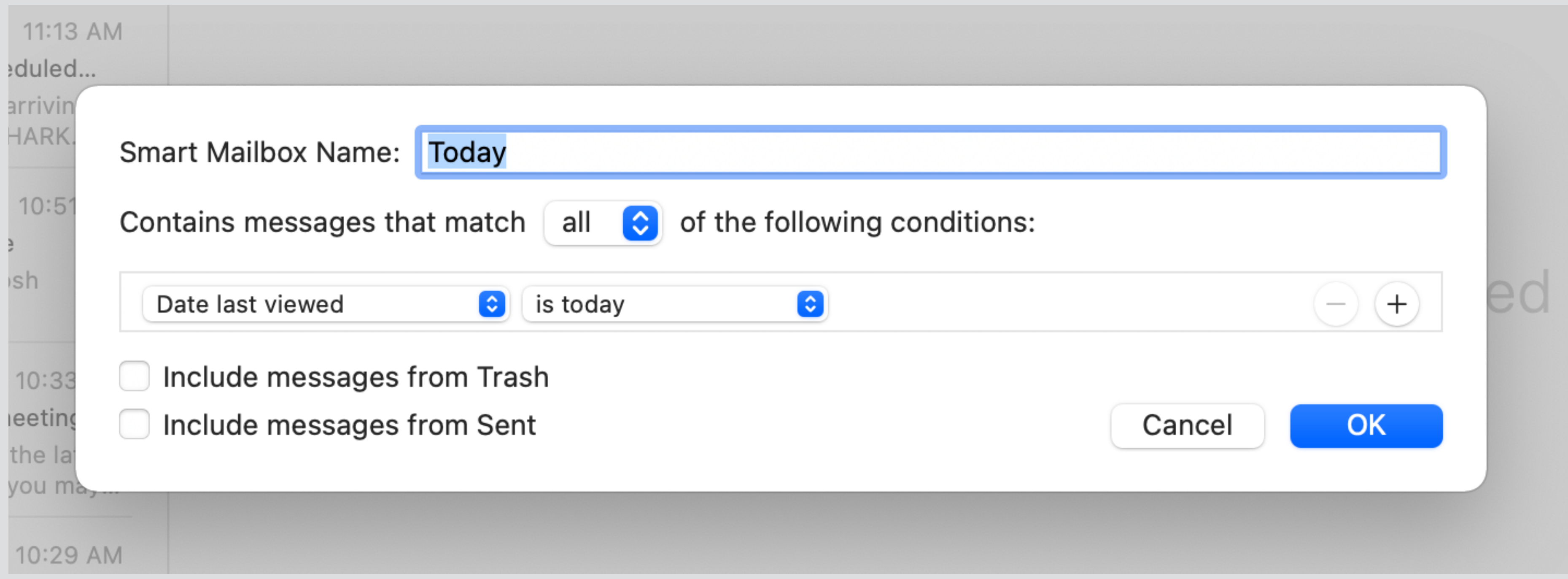

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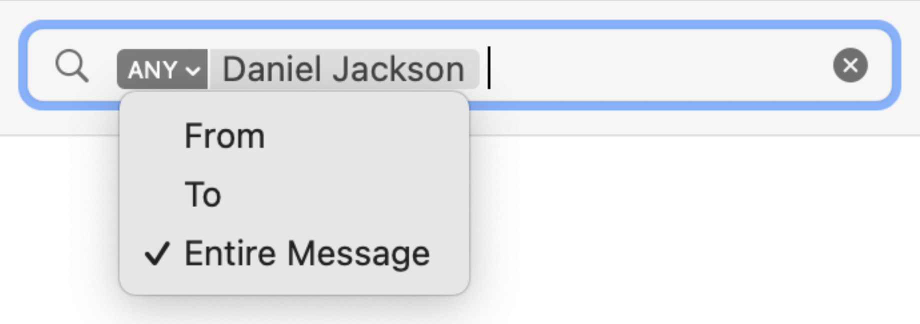
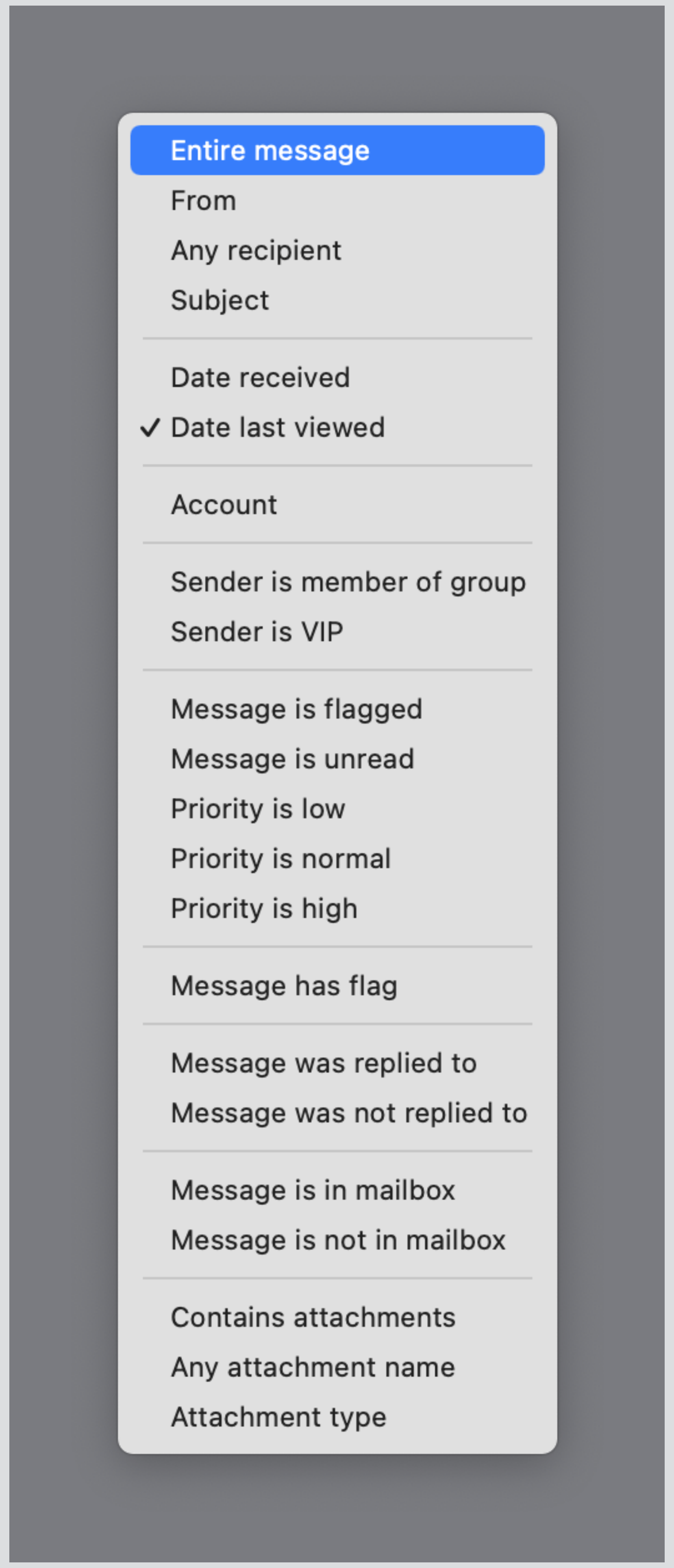
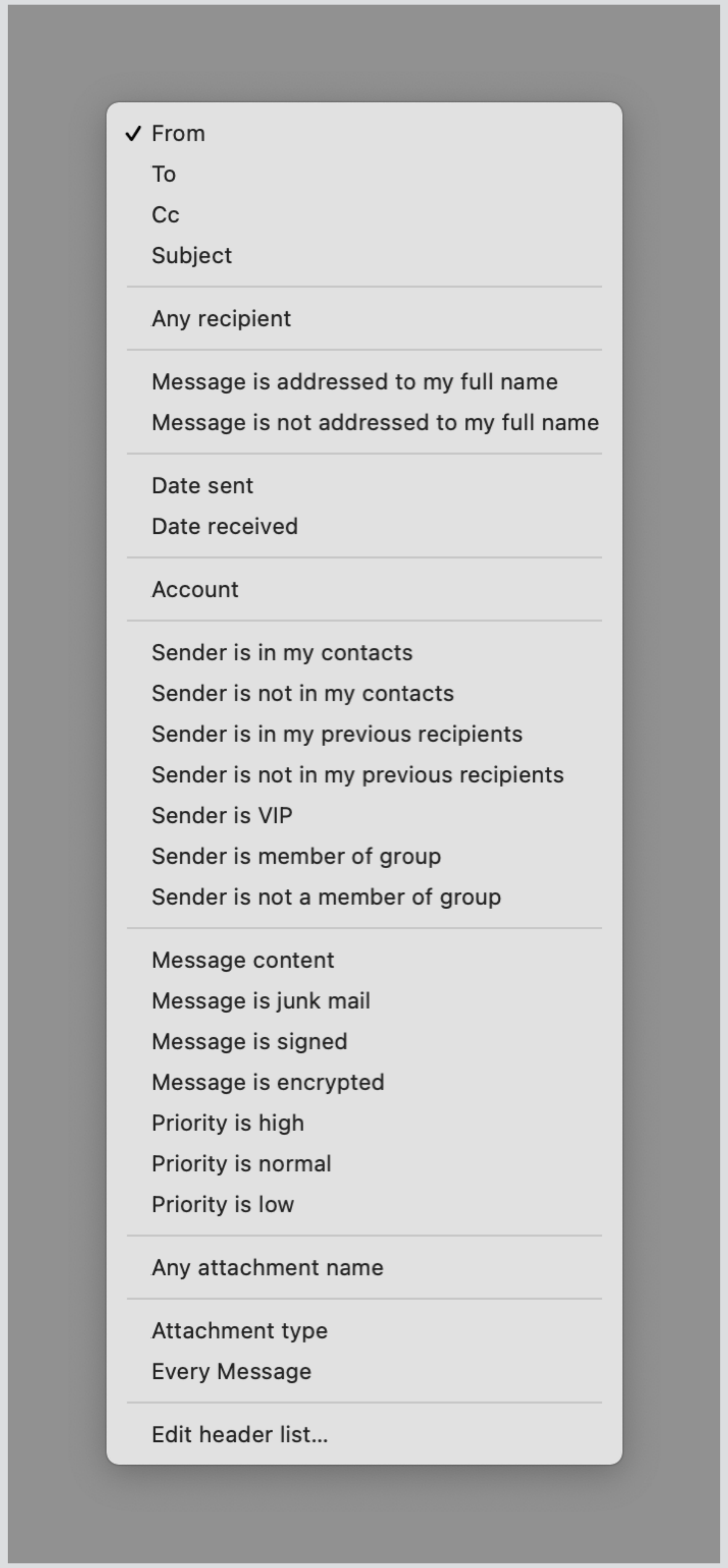


ANY Daniel Jackson

search options



smart folder options



rule options

diagnosis?

search, rule and smart folder
all include their own specialized concepts
incomparable features, different UIs

unify in a single message filter concept
include "create folder from search", eg

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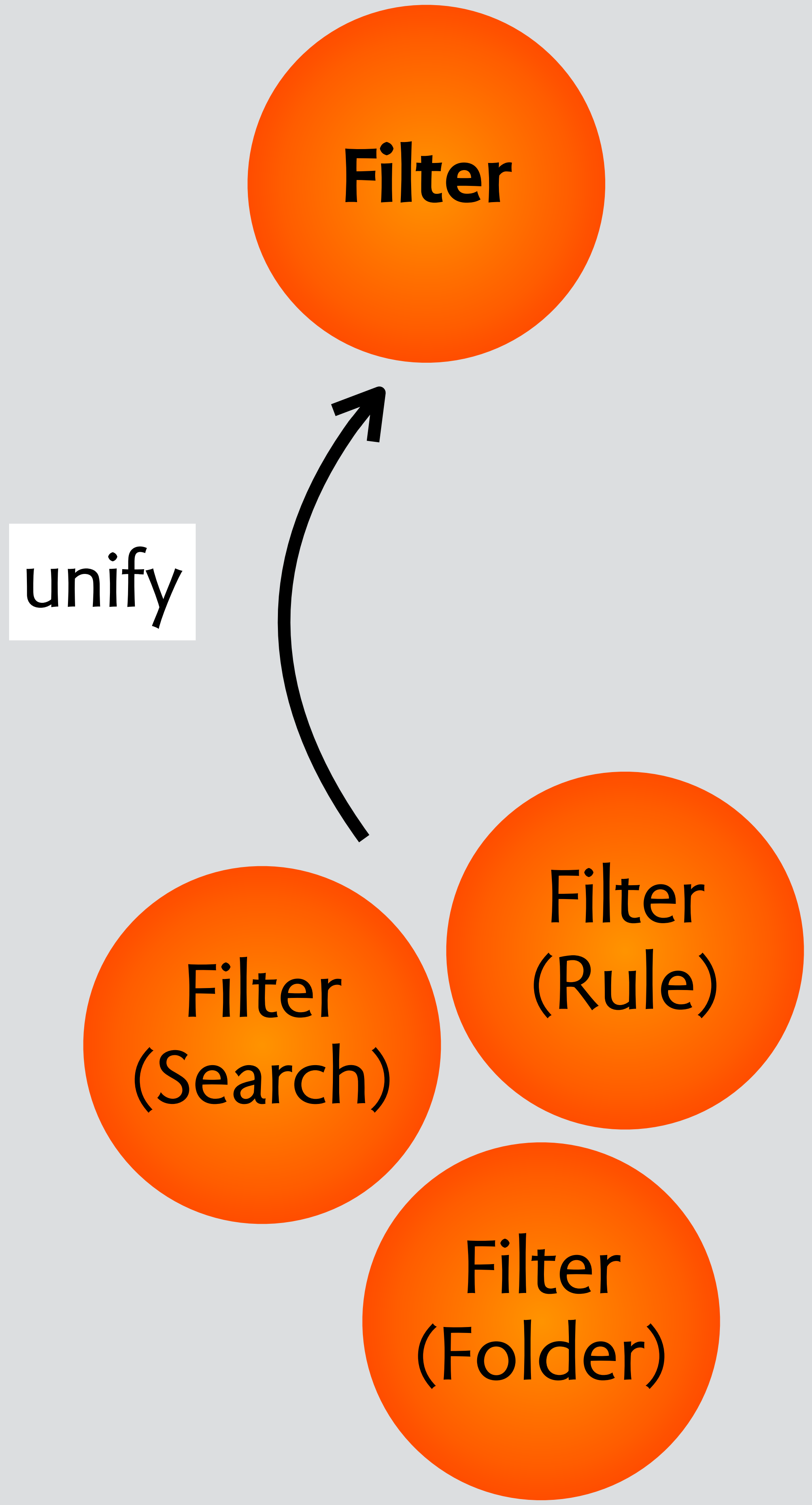
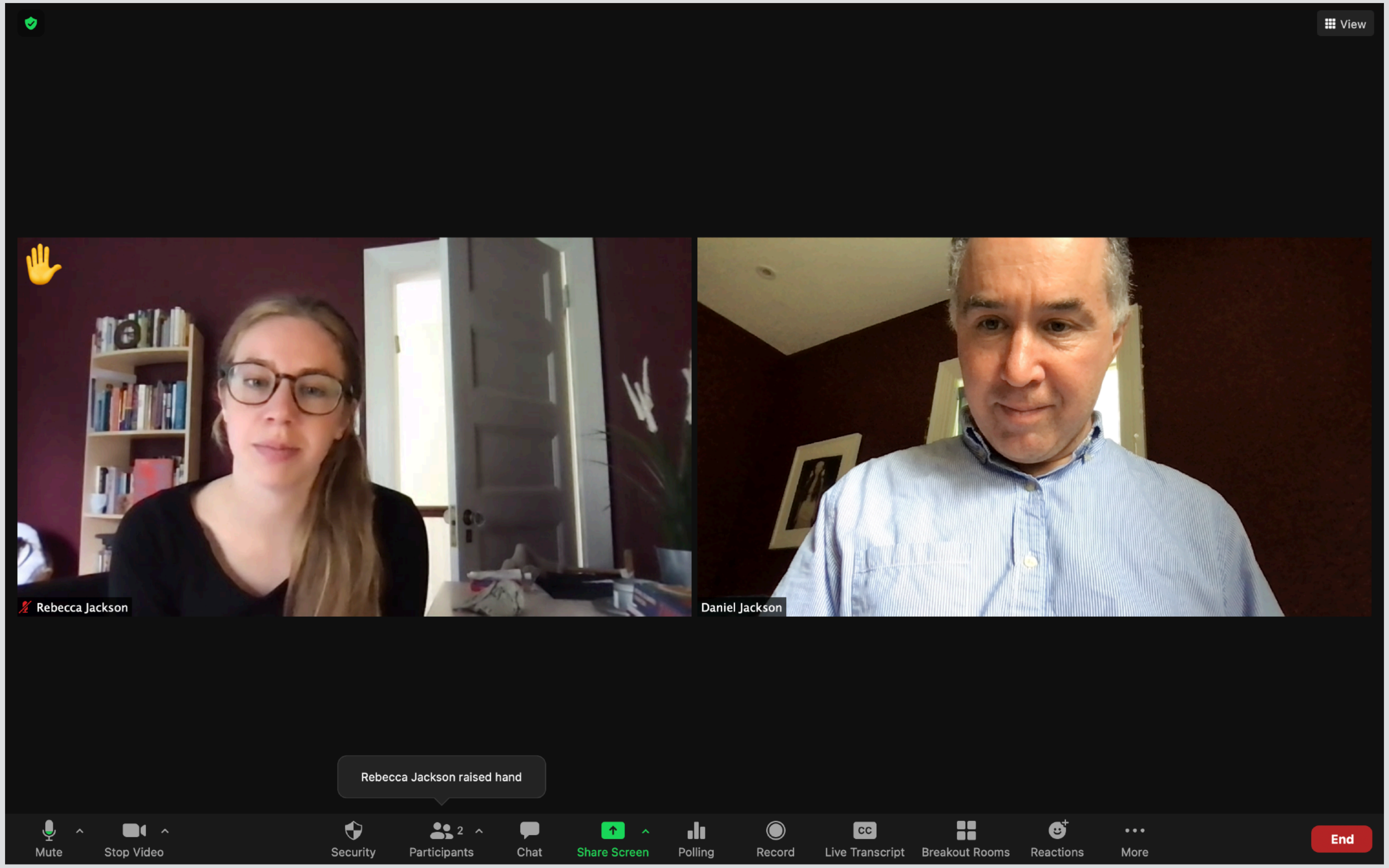


sticky hands

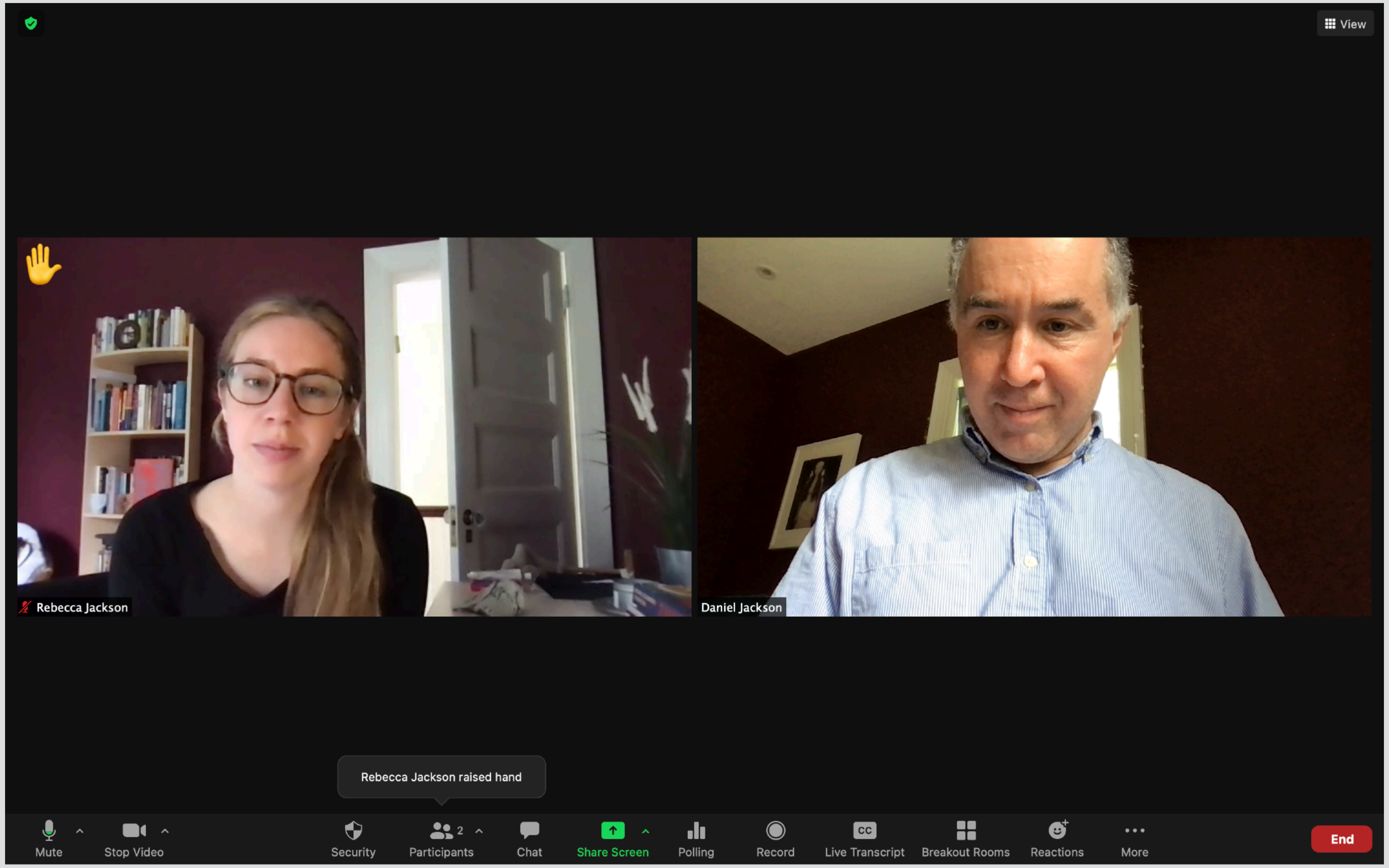
in zoom

zoom

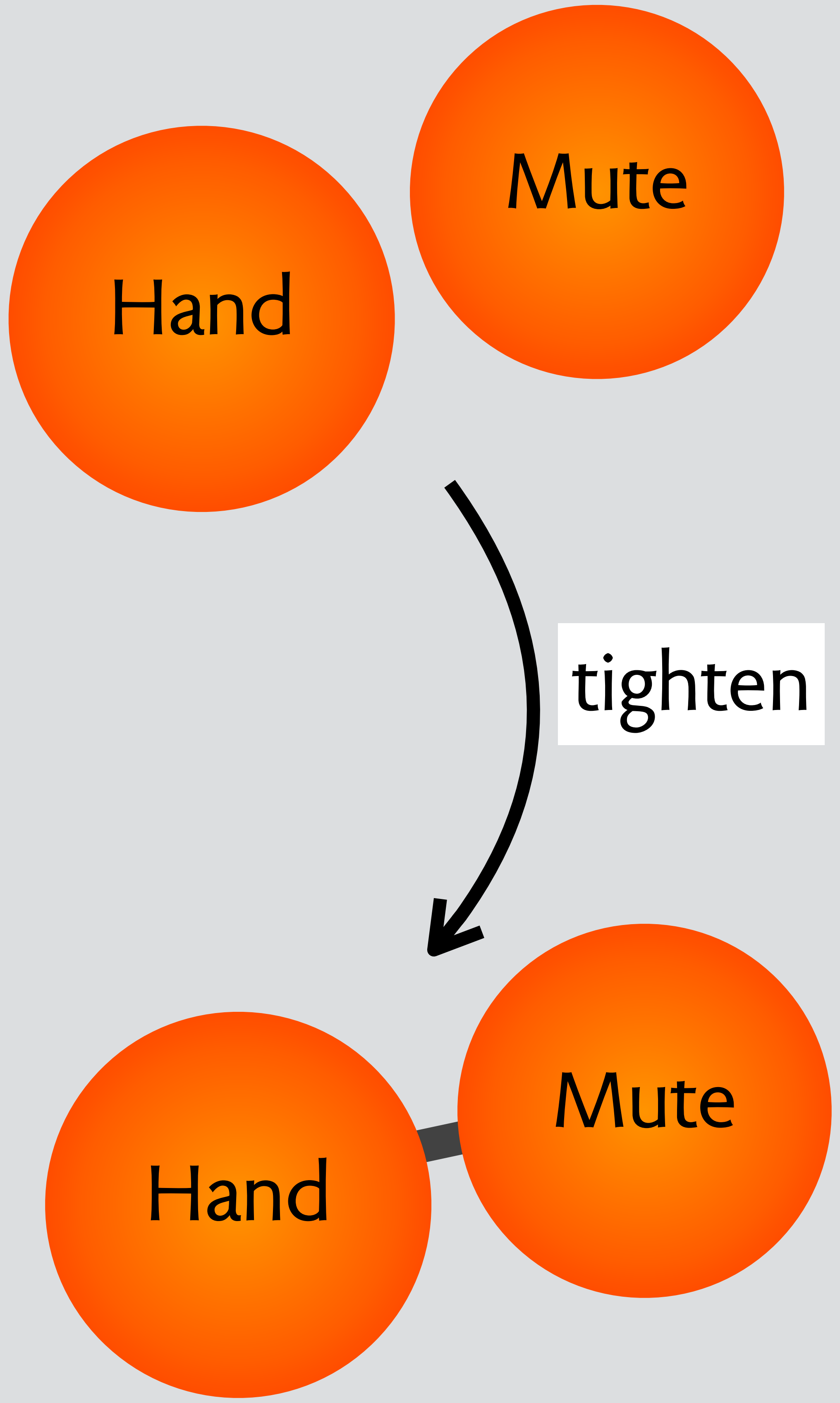


Rebecca Jackson raised hand

zoom



Rebecca Jackson raised hand



Hand

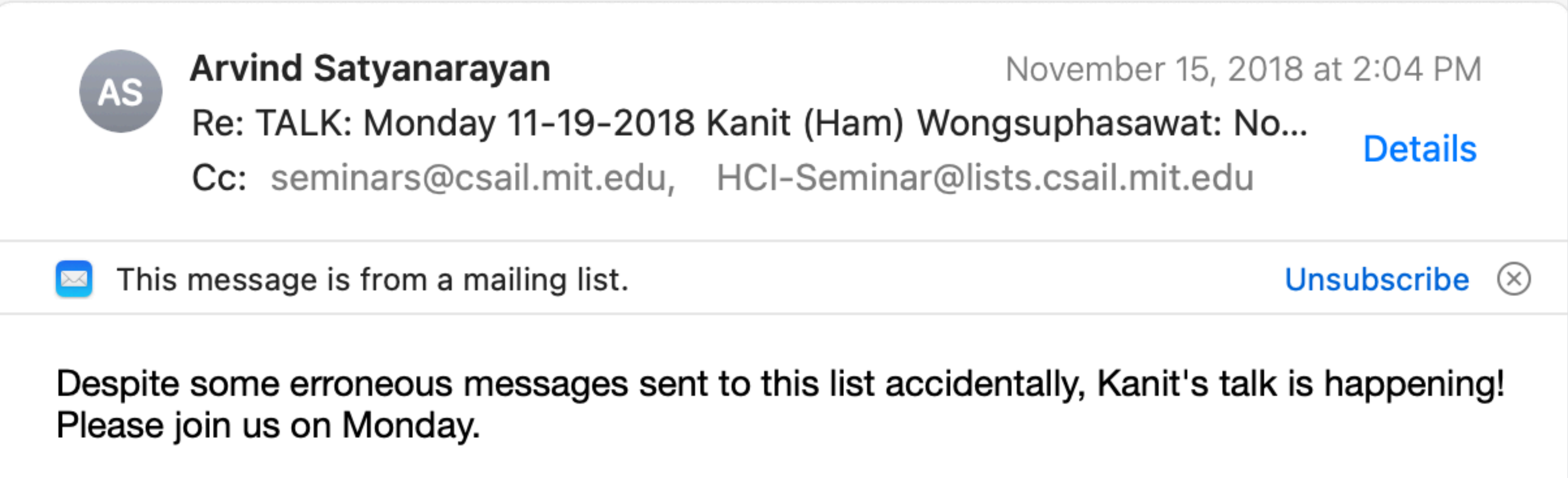
Mute

tighten

Hand

Mute

event deletion
in google calendar



Arvind Satyanarayan

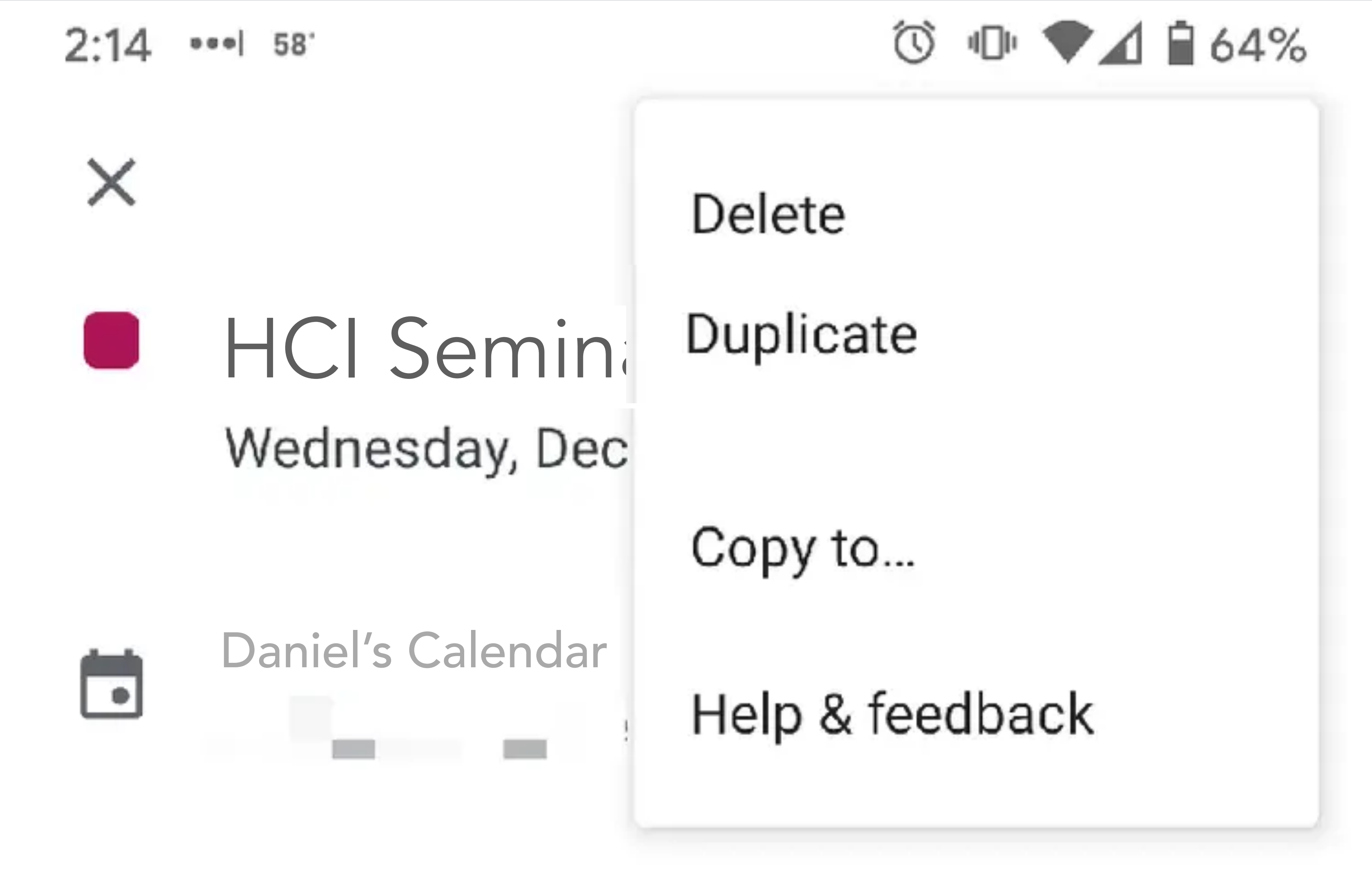
November 15, 2018 at 2:04 PM

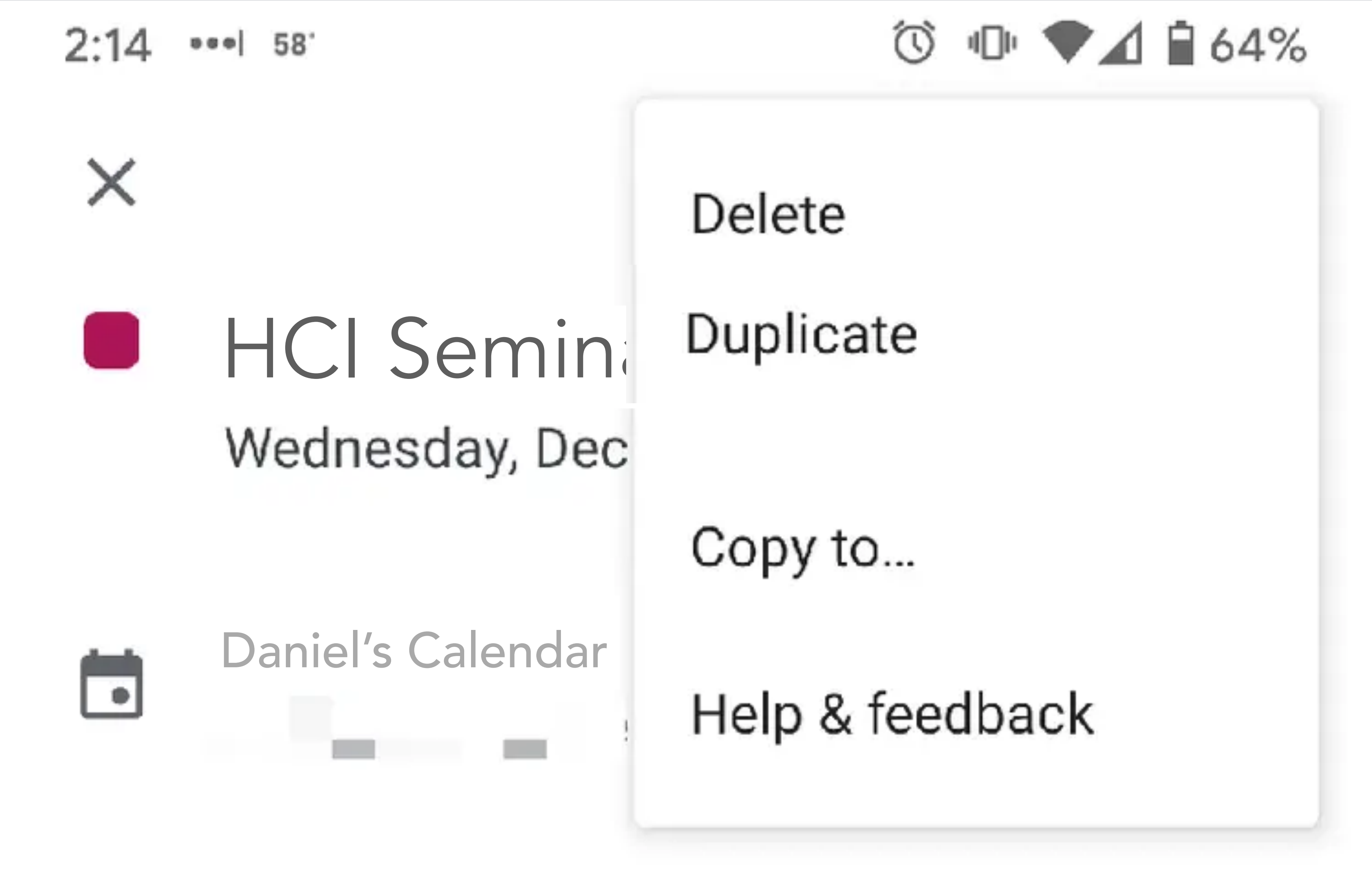
Re: TALK: Monday 11-19-2018 Kanit (Ham) Wongsuphasawat: No...

Cc: seminars@csail.mit.edu, HCI-Seminar@lists.csail.mit.edu

This message is from a mailing list.

Despite some erroneous messages sent to this list accidentally, Kanit's talk is happening! Please join us on Monday.


2:14
58°
64%
HCI Semin
Wednesday, Dec
Daniel's Calendar
Delete
Duplicate
Copy to...
Help & feedback

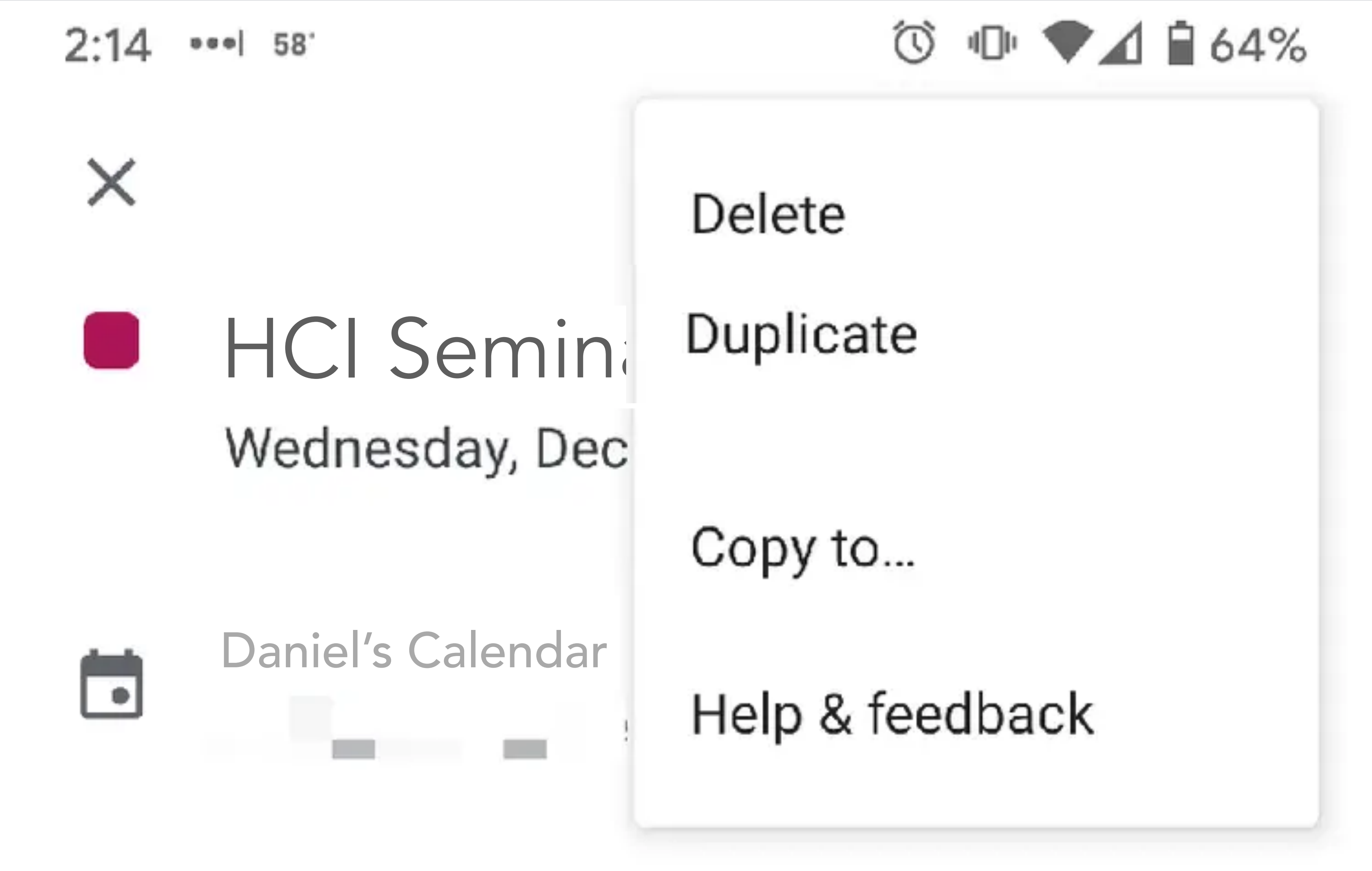


HCI Semin

Wednesday, Dec

Daniel's Calendar

seminar announced as **email** to listserv with attached calendar event



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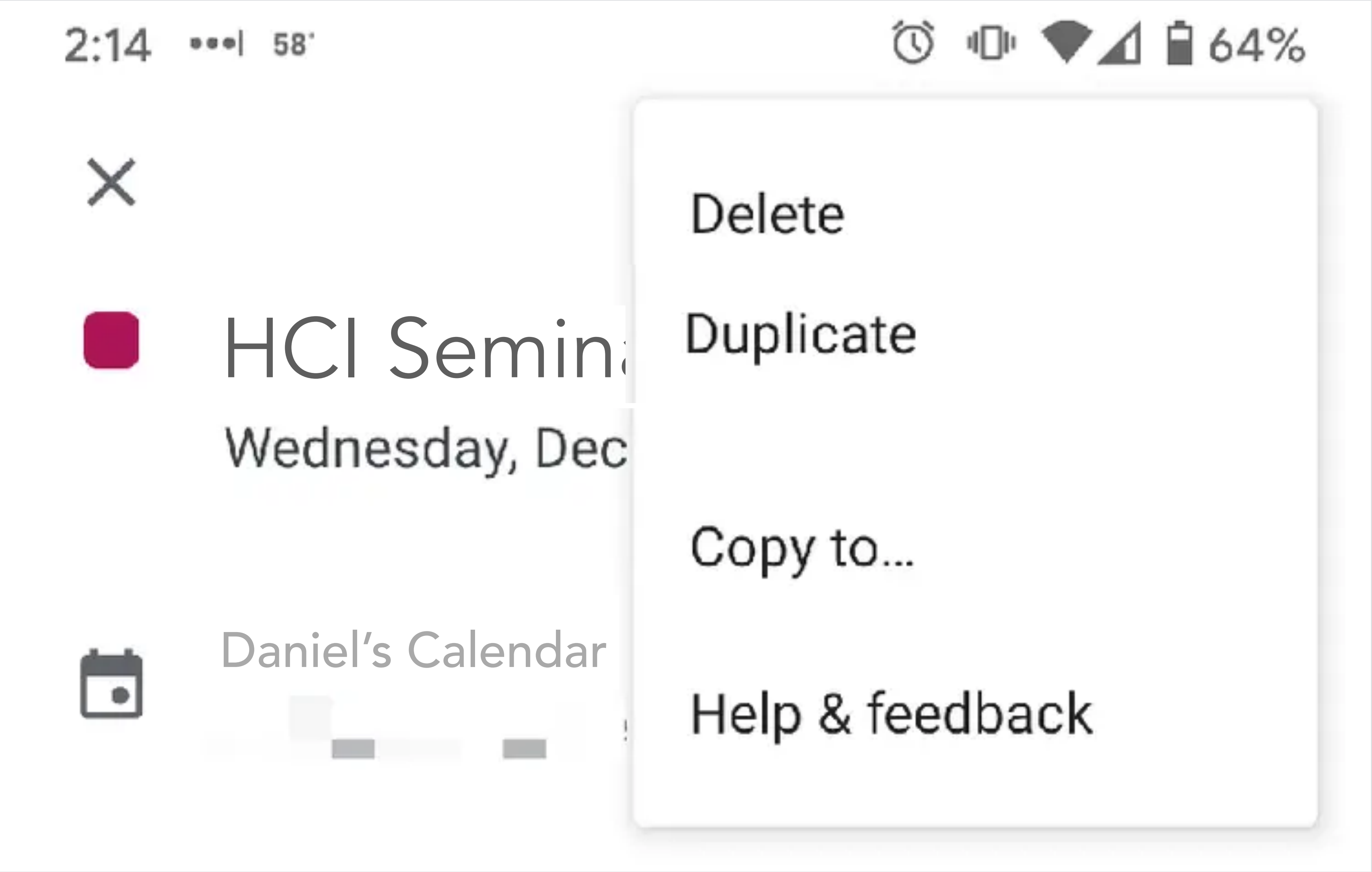
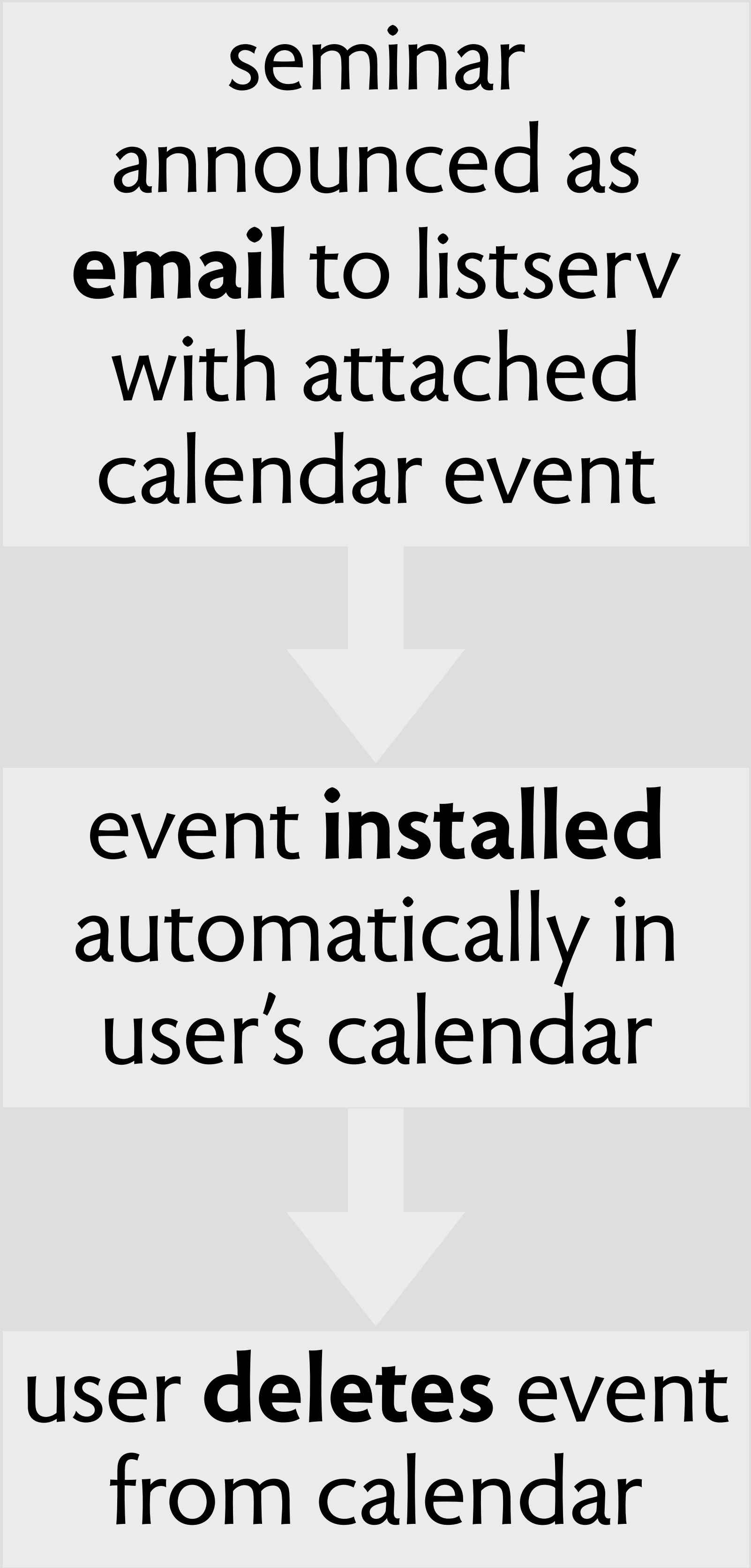


HCI Semin

Wednesday, Dec

Daniel's Calendar



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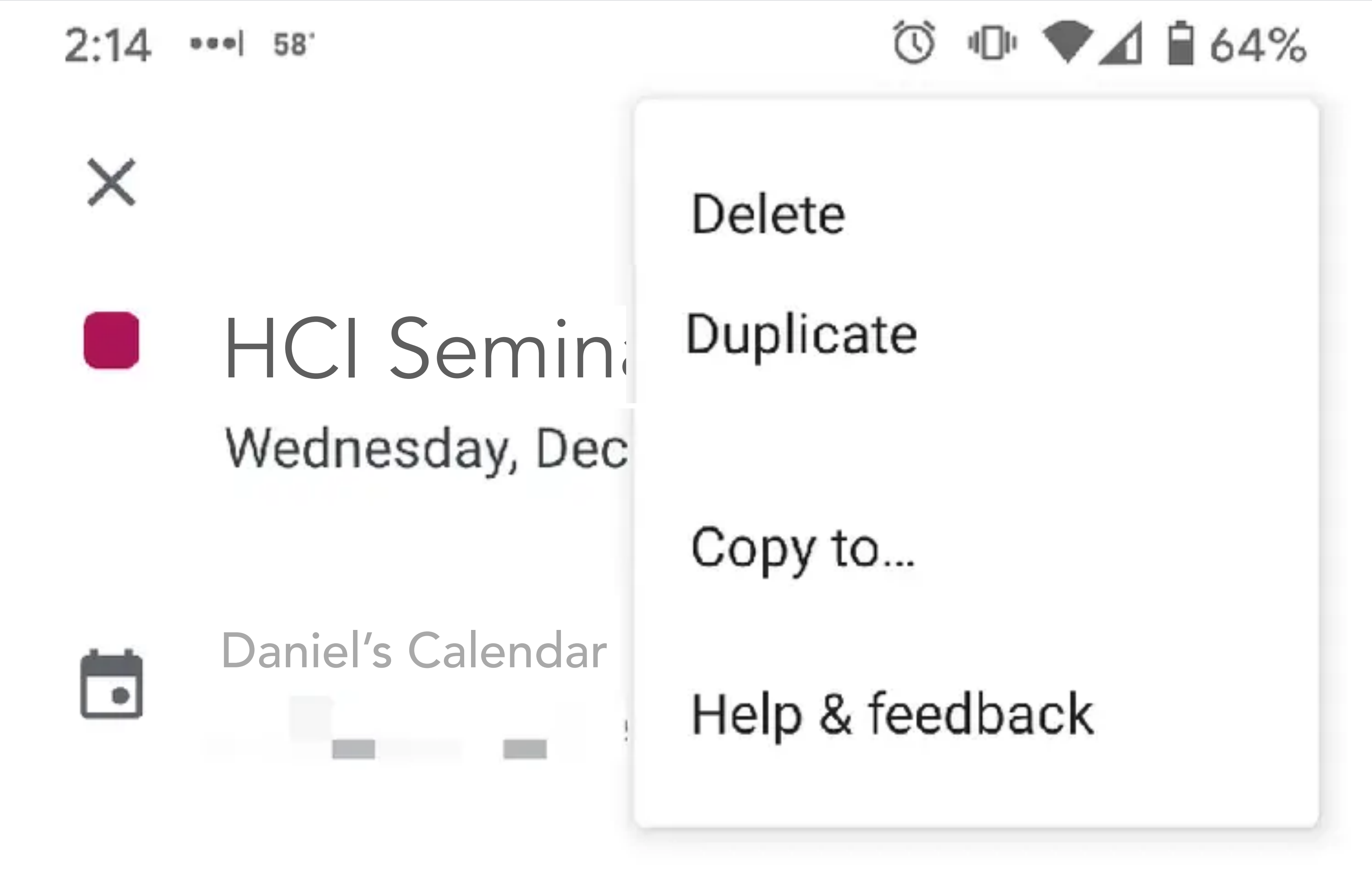
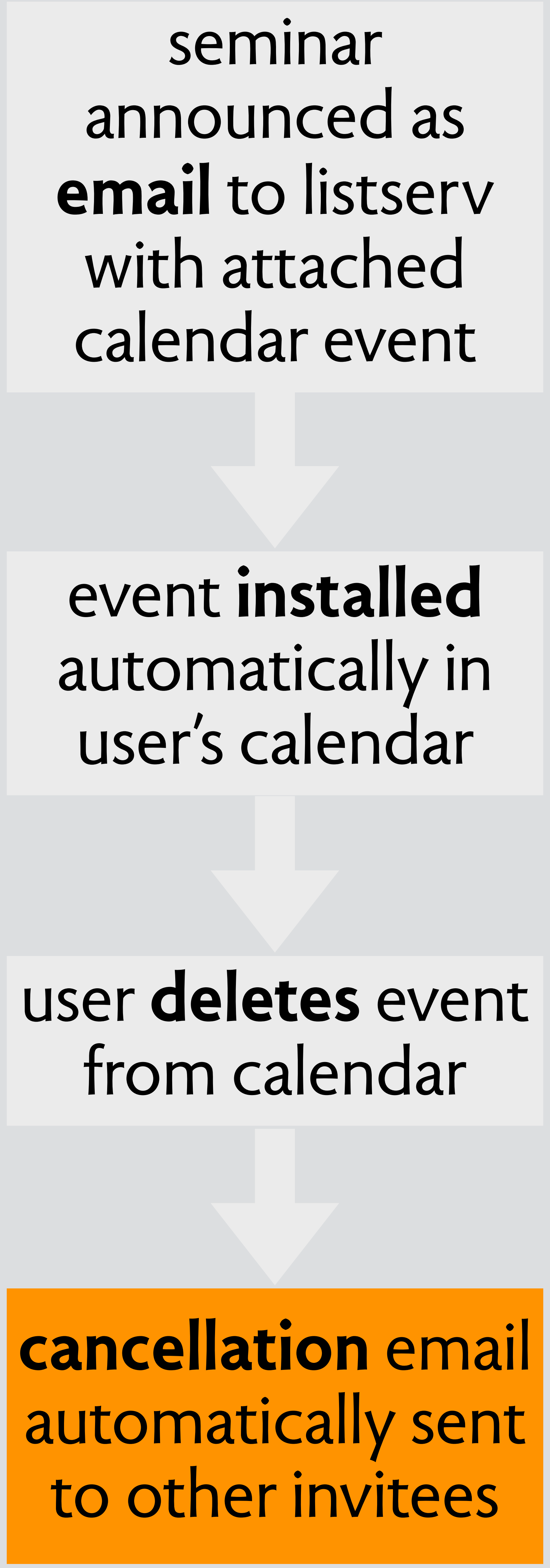
user **deletes** event from calendar





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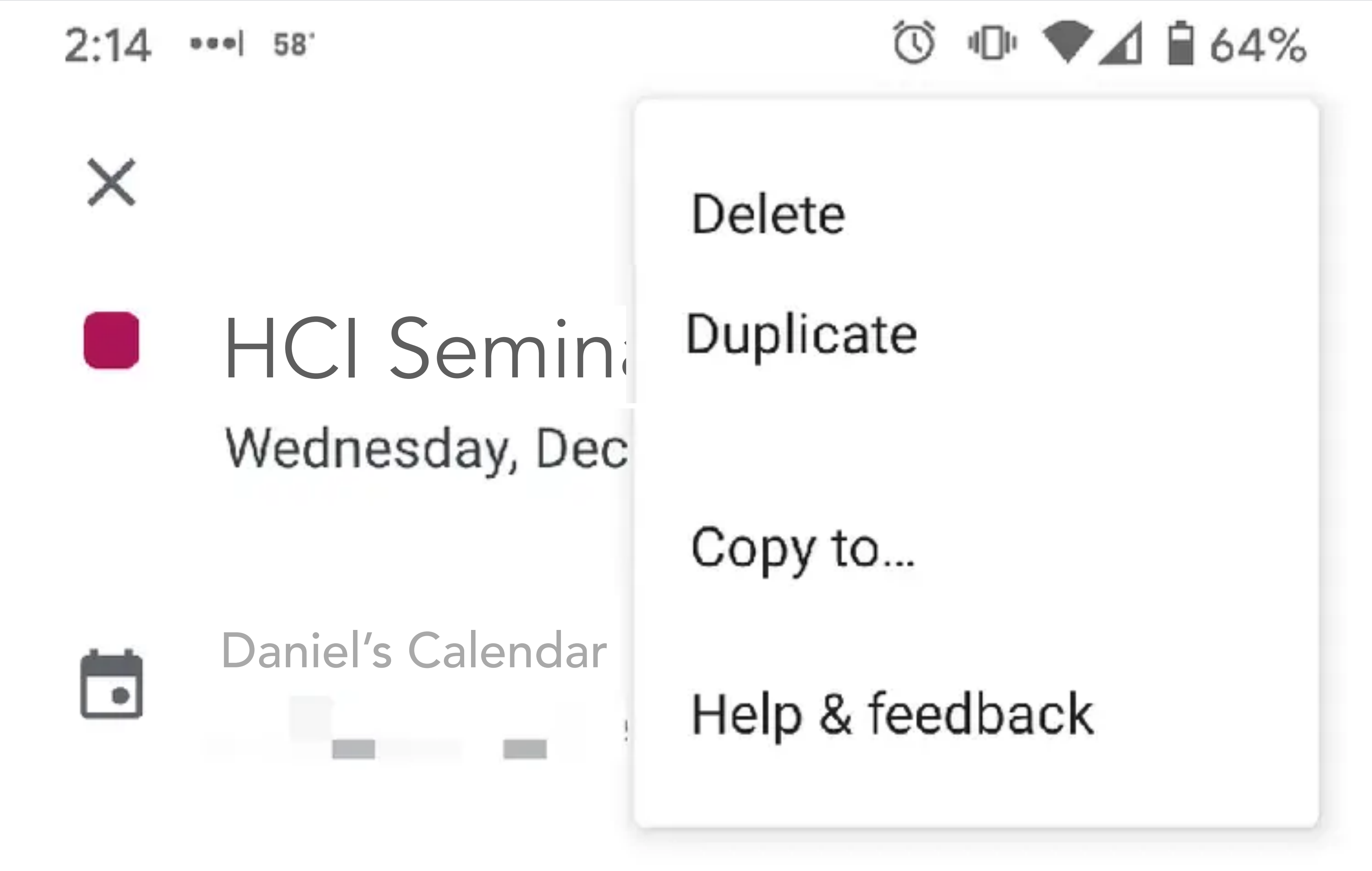
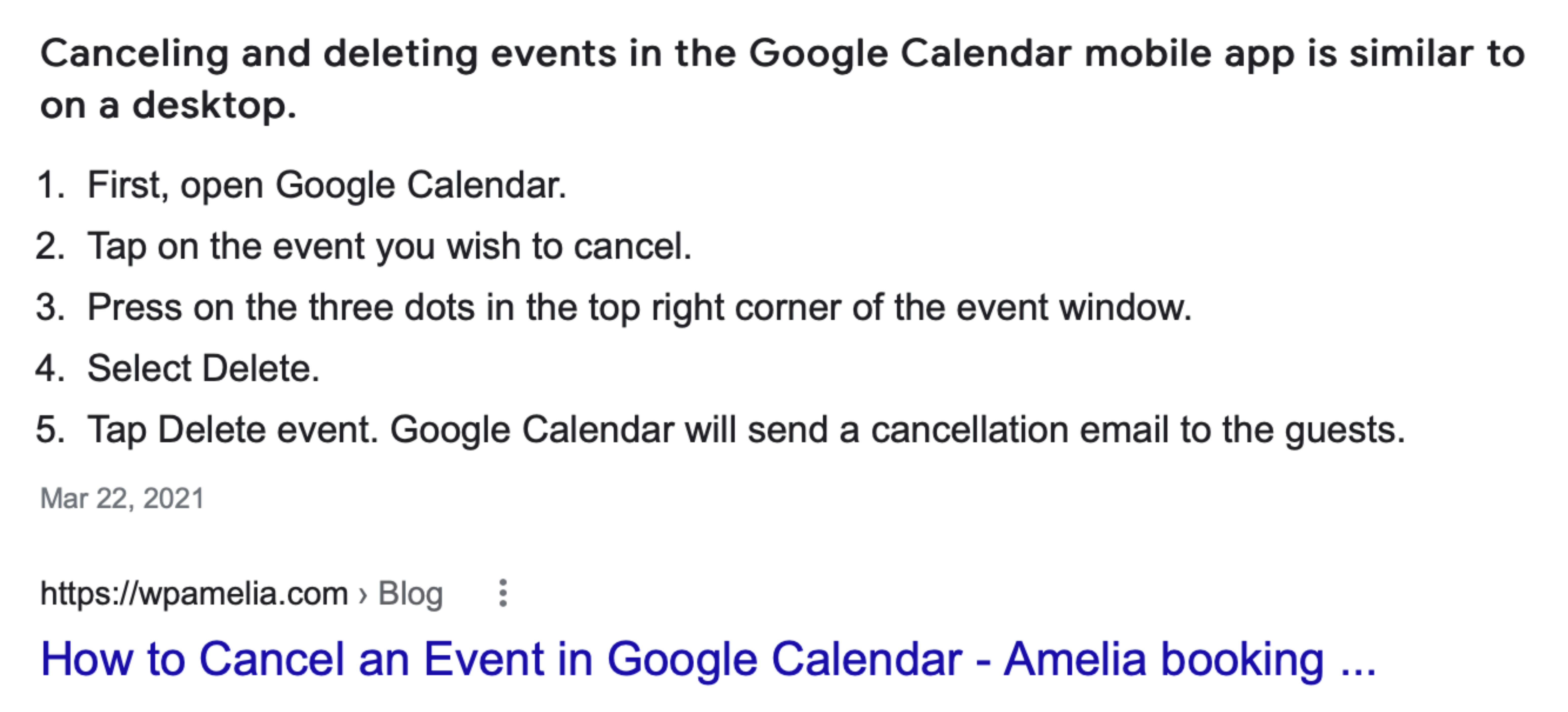
cancellation email automatically sent to other invitees





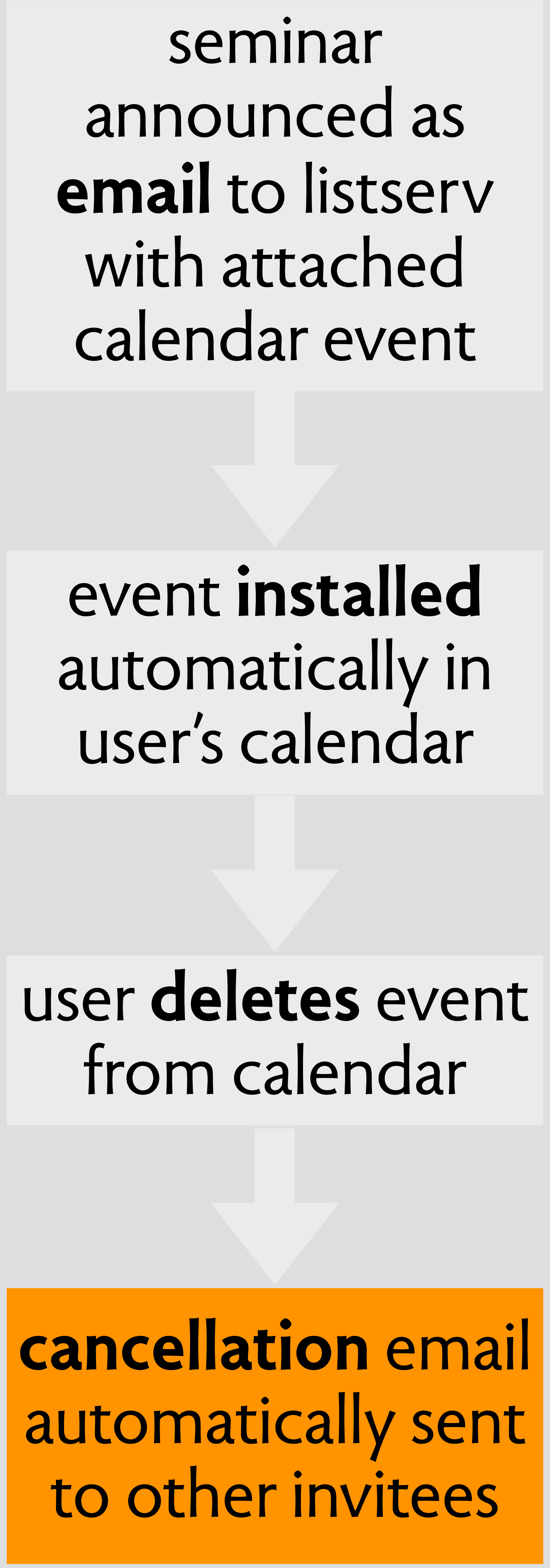
Canceling and deleting events in the Google Calendar mobile app is similar to on a desktop.

1. First, open Google Calendar.
2. Tap on the event you wish to cancel.
3. Press on the three dots in the top right corner of the event window.
4. Select Delete.
5. Tap Delete event. Google Calendar will send a cancellation email to the guests.

Mar 22, 2021

https://wpamelia.com › Blog ⋮

How to Cancel an Event in Google Calendar - Amelia booking ...



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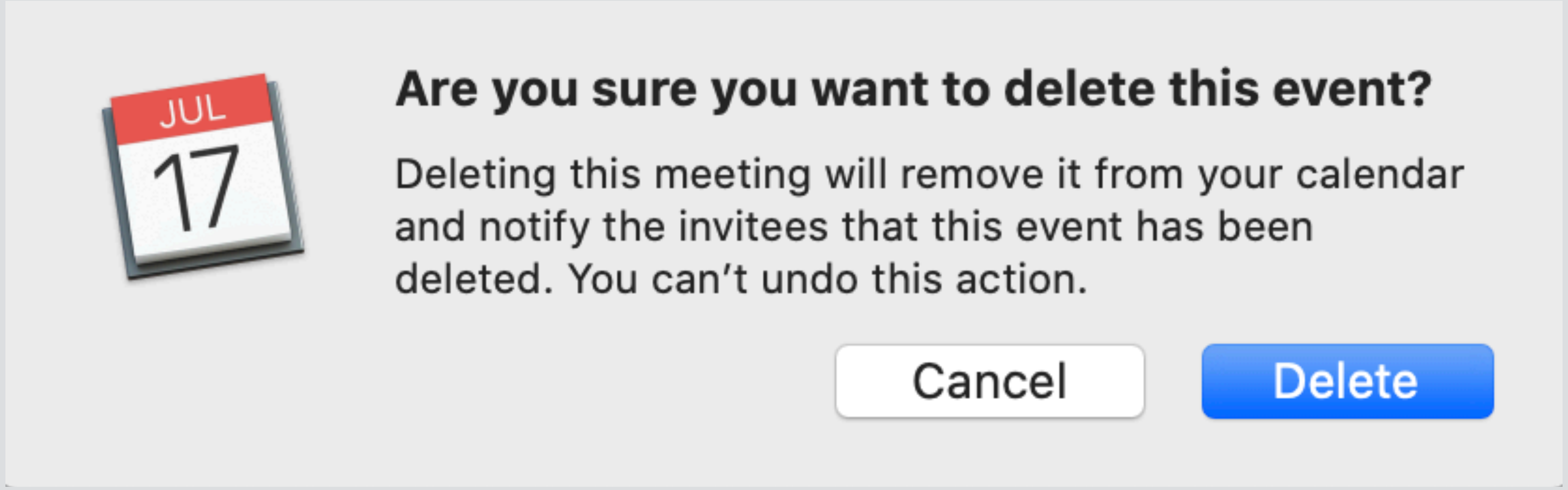

Are you sure you want to delete this event?

Deleting this meeting will remove it from your calendar and notify the invitees that this event has been deleted. You can't undo this action.

a long time problem in iCal too

how to delete spam calendar events?

diagnosis?

diagnosis?

concept calendar

purpose record engagements

actions

```
  createEvent (...): Event
  deleteEvent (e: Event)
   ...
```

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concept invitation

purpose coordinate events

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accept (e: Event)
decline (e: Event)
 ...
```

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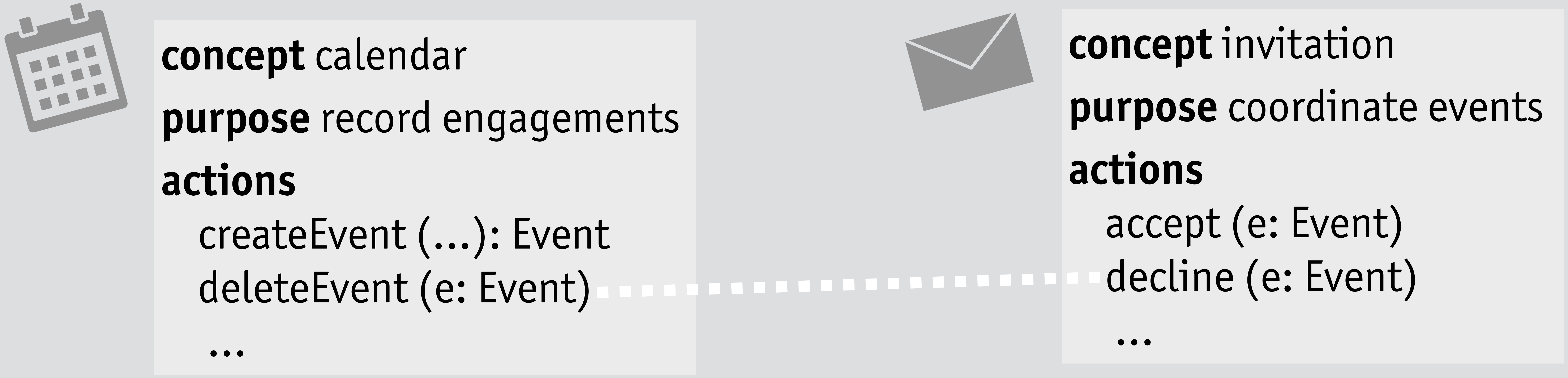

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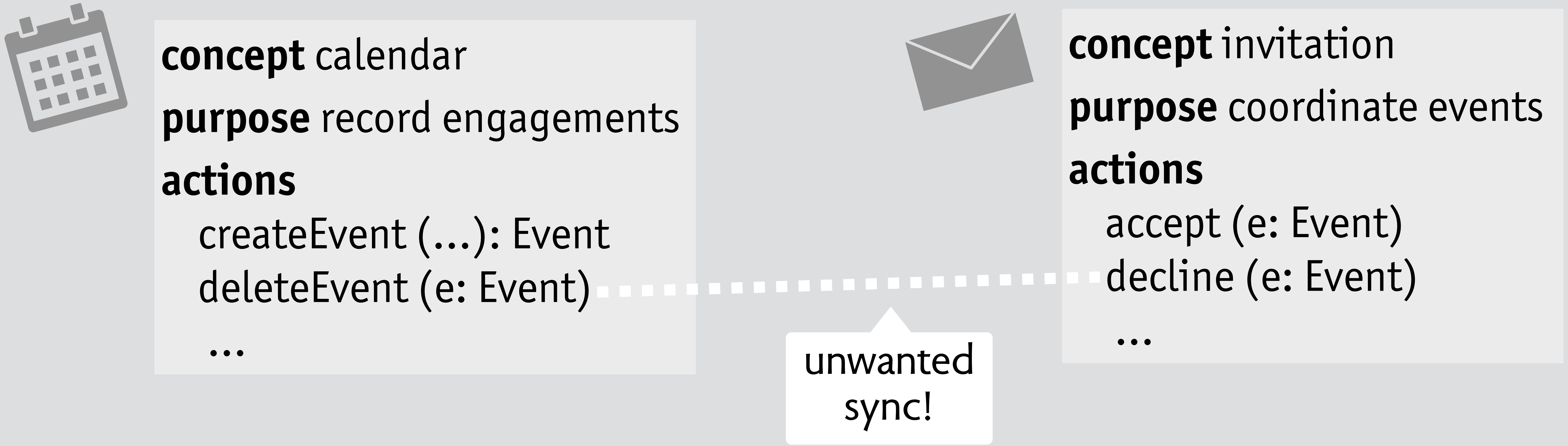

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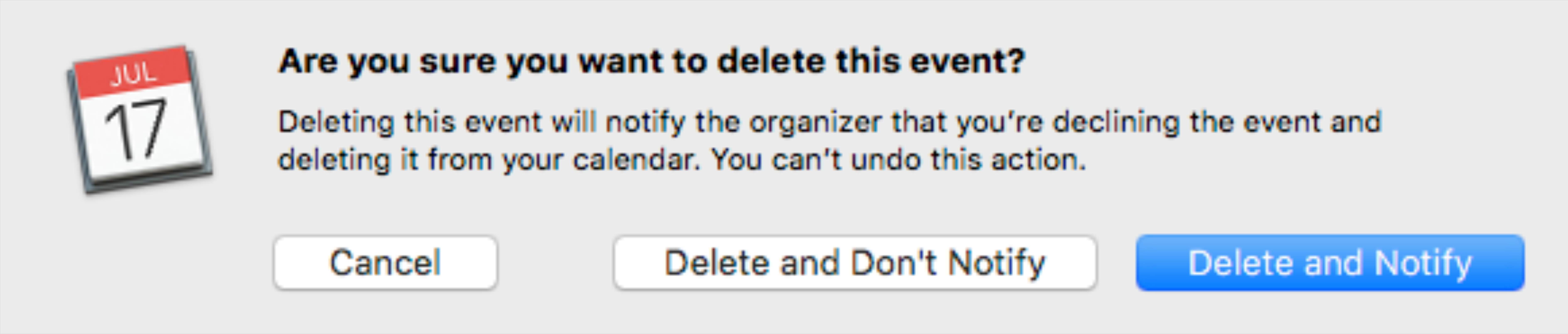
unwanted sync!

apple's solution

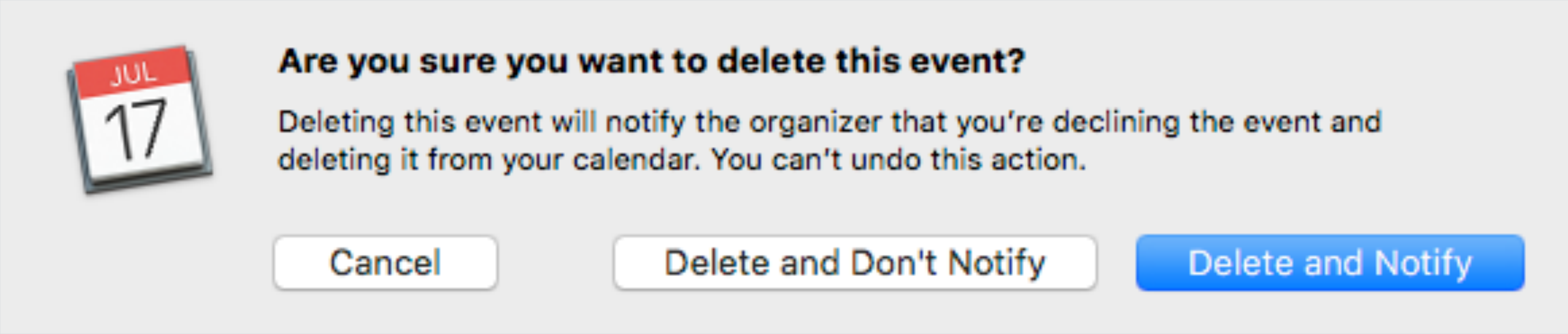


Are you sure you want to delete this event?

Deleting this event will notify the organizer that you're declining the event and deleting it from your calendar. You can't undo this action.

resolution to design problem
make sync optional

apple's solution



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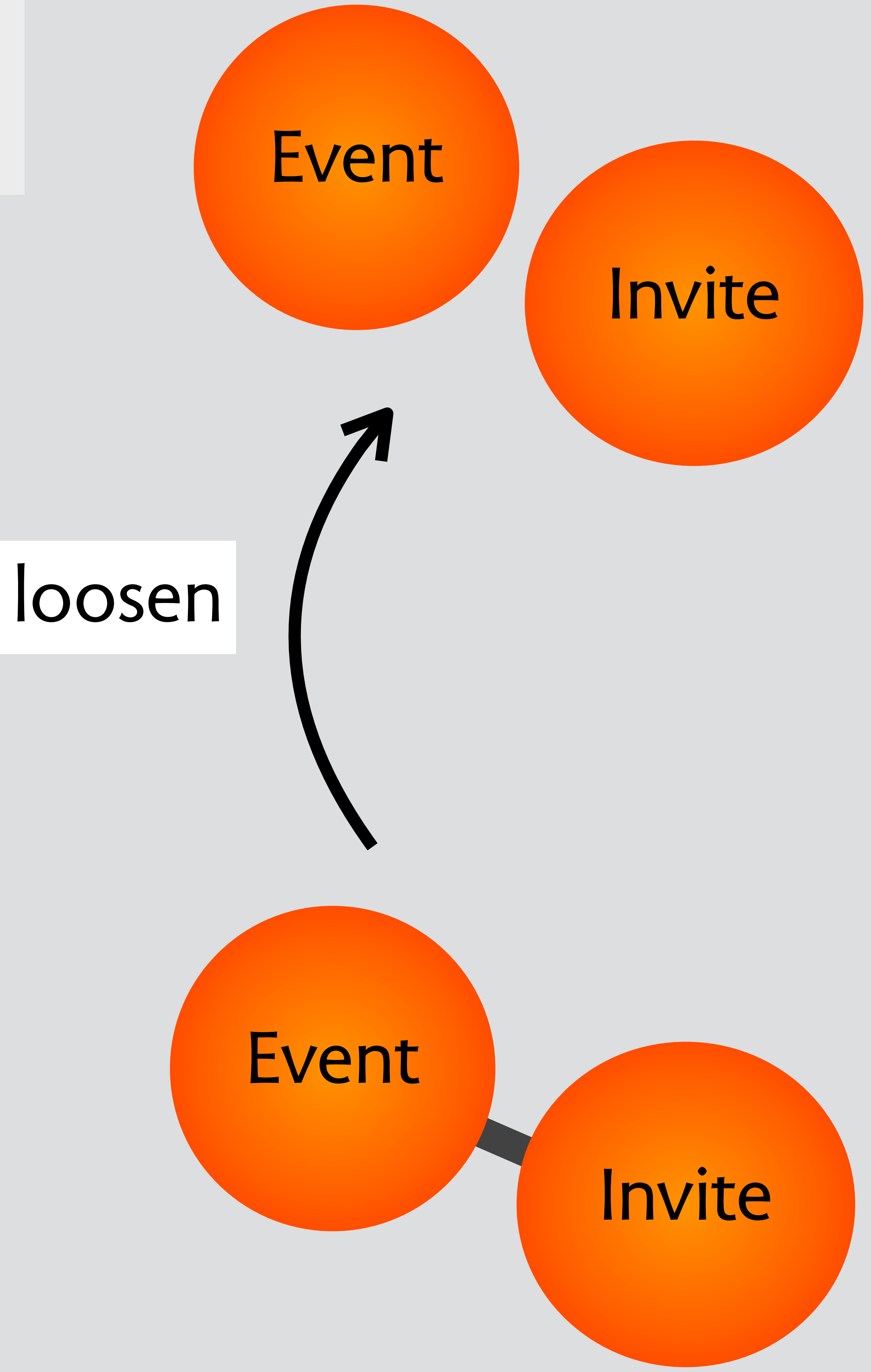

Event
Invite
loosen
Event
Invite

takeaways

takeaways

structure your software design with concepts
inventory the concepts, identify the critical ones
see if you can describe them fully independently
then formulate interactions as synchronizations

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never a panacea, always a tradeoff

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only hinted at this, but equally important
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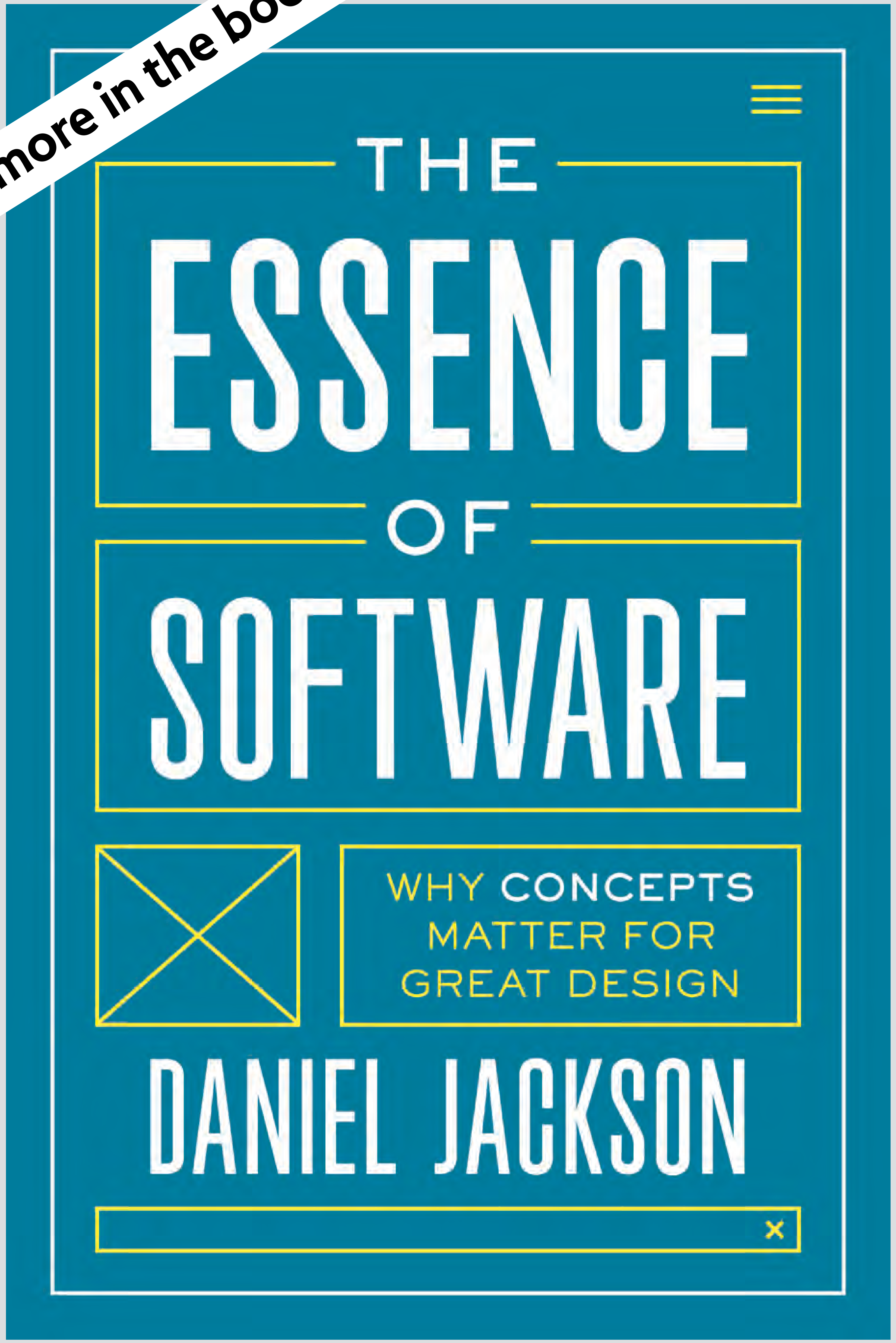
express your design as sync of familiar concepts?

in formal methods
can concepts help structure & validate models?

much more in the book



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about concept design!
forum.softwareconcepts.io