# Linux Kernel Trends and Future Goals for Diversity

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# BACKGROUND

- Kernel maintainers are not scaling is a known concern, can expanding the diversity of maintainers participating improve the situation?
- How to create incentives for developers from diverse communities to participate on an ongoing basis?

The basic premise is to increase the pool of potential long term participants.

How can be done?

# Understanding Kernel Trends

**Methodology**

- Commit data up to v5.14
- Identified 21,821 unique contributors
  - 33,065 email addresses
- Used genderComputer (https://github.com/tue-mdse/genderComputer) to identify their gender
  - Some manual verification for people who have joined since 2018
  - A small proportion of names are very hard to classify

# Contributors to the kernel per release

Red: women
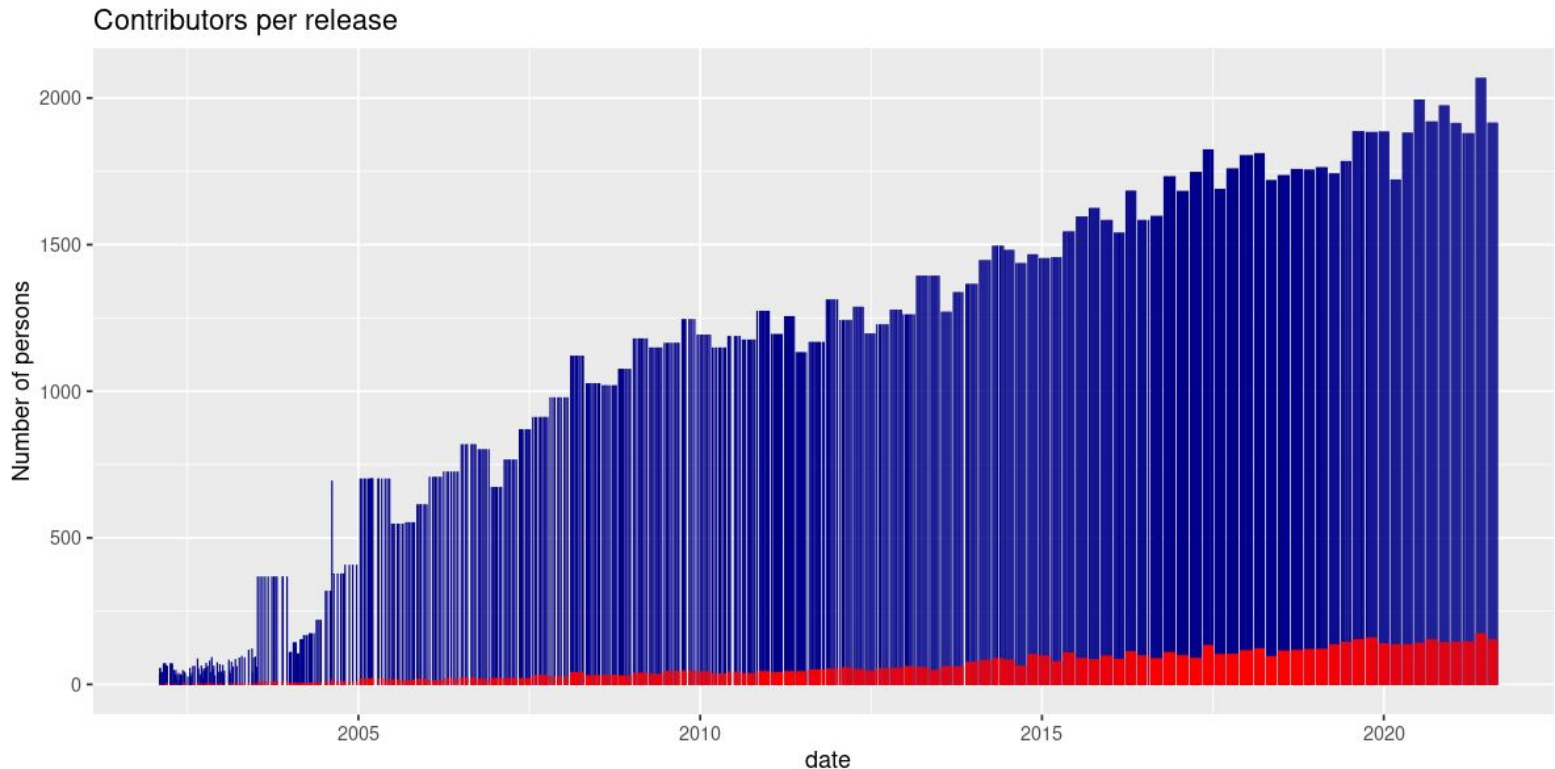
# Women who have contributed Commits

Left-hand-side: absolute numbers
Right-hand-side: relative numbers



Authors per release (only women shown)
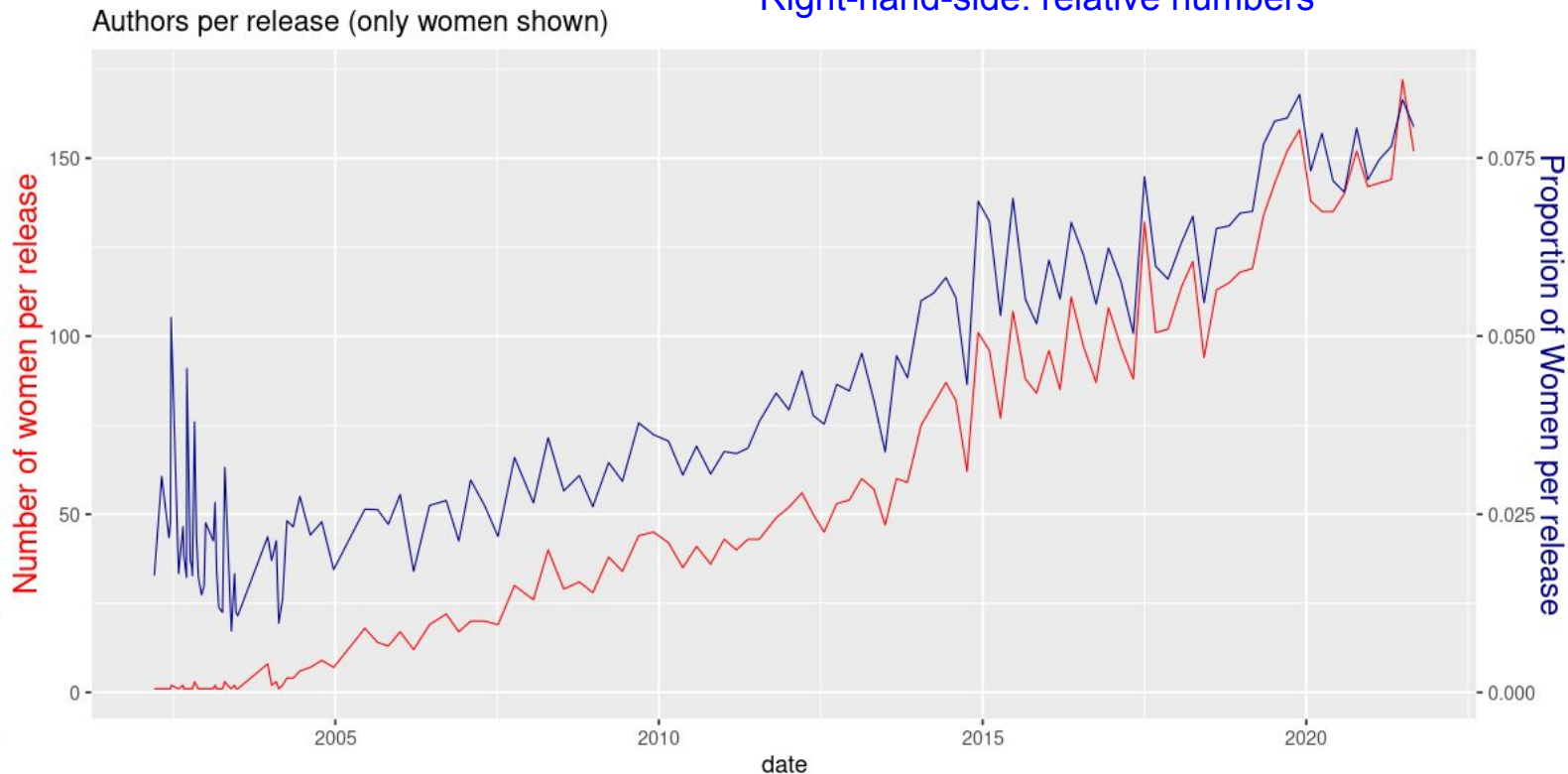
# Commits authored by Women

Left-hand-side: absolute numbers
Right-hand-side: relative numbers
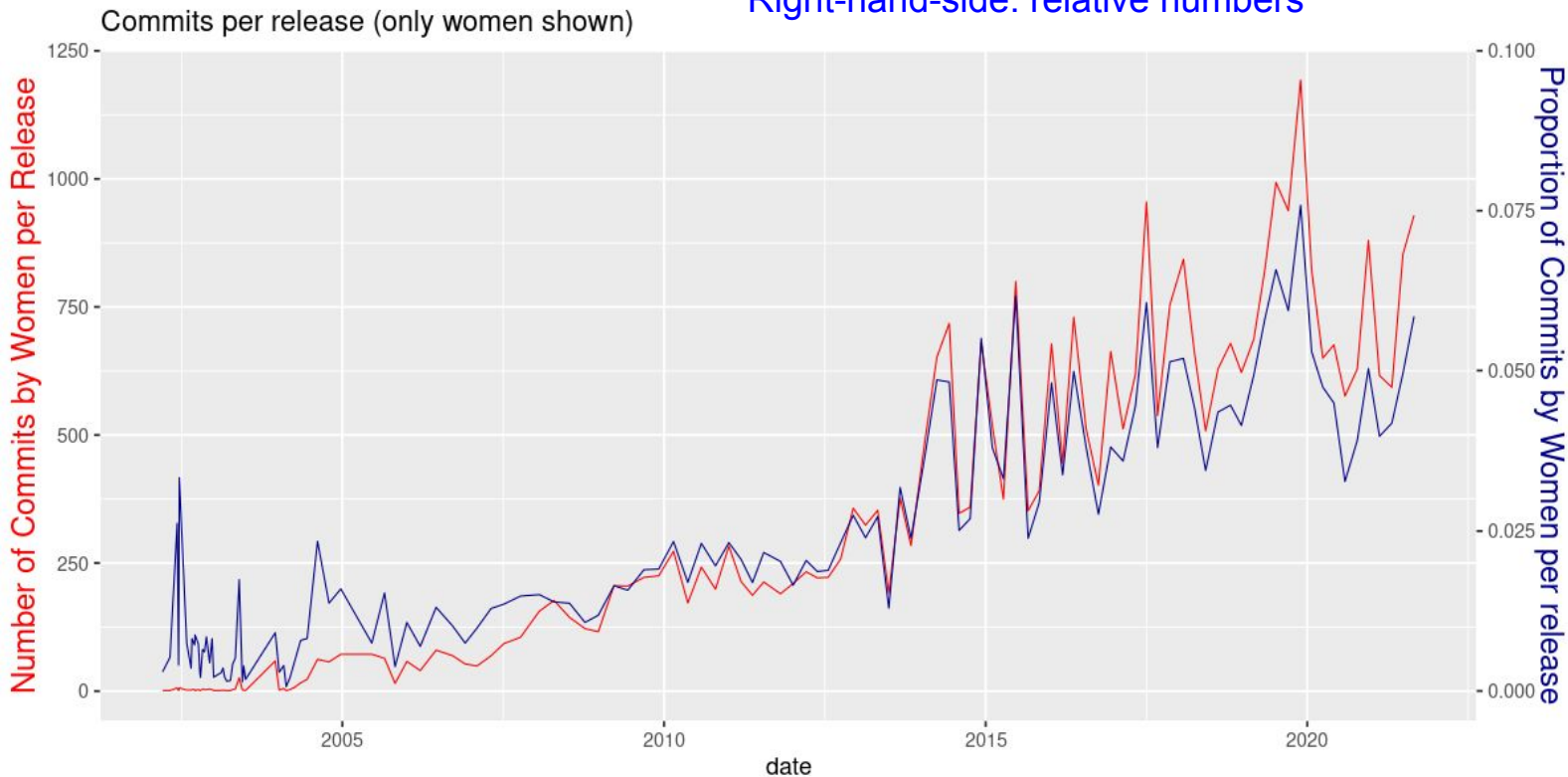


Commits per release (only women shown)

# Women who commit somebody else's code

Left-hand-side: absolute numbers
Right-hand-side: relative numbers

Women with merges and/or commits authored by somebody else

**Only 17 have ever done it
(out of 701 contributors, 2.5%)**
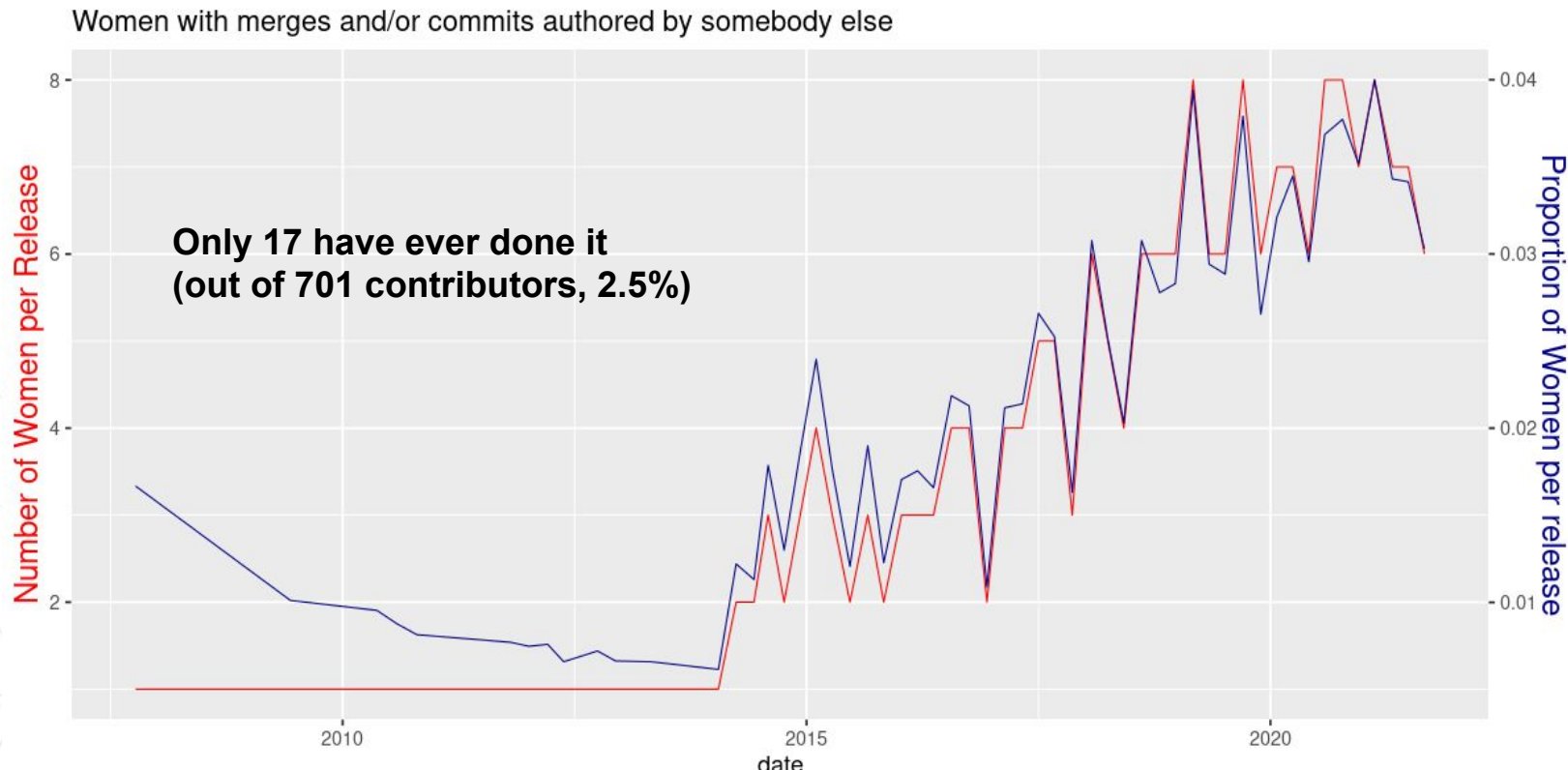
# Commits by Women who commit somebody else's code

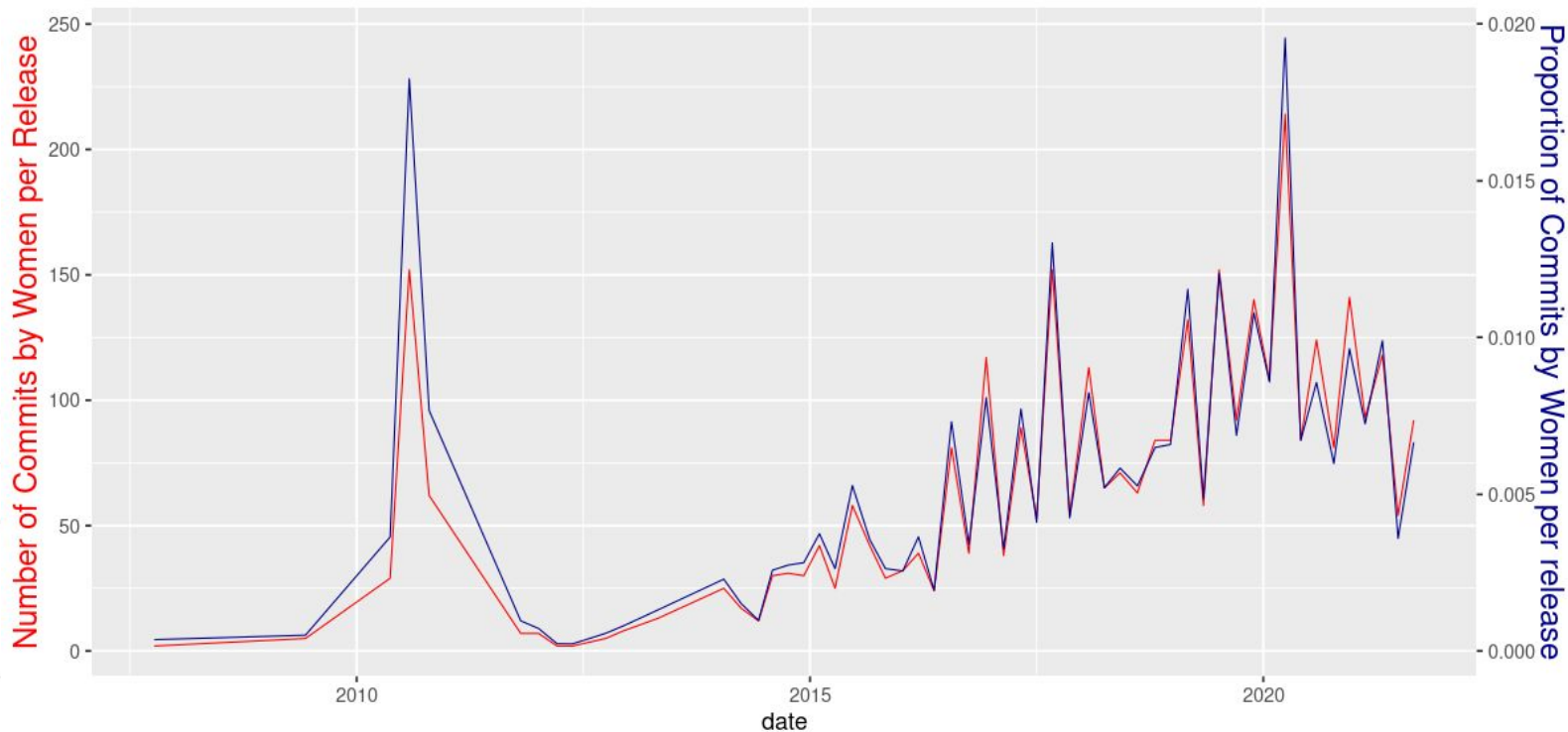Left-hand-side: absolute numbers
Right-hand-side: relative numbers



Commits committed by non-author + merges (only women shown)

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Mentorship programs:
- participants: 48
- 2 have not contributed a commit

Columns:
- **nreleases**: number of releases they contributed to (median 4)
- **ndays**: number of days between first and last commit (median 322)
- **ndayssince**: days since last commit (median 395.5)
- **cids-authored**: commits that have the mentee as the author (median 13.5)
- **cids-com**: commits that have the mentee as the committer (**all zero**)
- **nlines**: number of lines that blame associates with that mentee in v5.14 (median 187.5)
- **ntokens**: number of tokens authored by that mentee in v5.14 (median 396.5)

| program        | nreleases | ndays | ndayssince | cids-authored | cids-comm | nlines | ntokens |
|----------------|-----------|-------|------------|---------------|-----------|--------|---------|
| LF Mentorship  | 1         | 1     | 677        | 3             | 0         | 0      | 0       |
| LF Mentorship  | 1         | 1     | 217        | 1             | 0         | 0      | 0       |
| LF Mentorship  | 1         | 5     | 332        | 2             | 0         | 27     | 0       |
| Outreachy      | 2         | 18    | 1070       | 19            | 0         | 330    | 348     |
| LF Mentorship  | 1         | 74    | 144        | 3             | 0         | 15     | 26      |
| LF Mentorship  | 2         | 84    | 144        | 9             | 0         | 35     | 34      |
| LF Mentorship  | 2         | 84    | 137        | 10            | 0         | 56     | 192     |
| Outreachy      | 2         | 106   | 959        | 23            | 0         | 77     | 148     |
| LF Mentorship  | 3         | 120   | 309        | 3             | 0         | 20     | 36      |
| LF Mentorship  | 2         | 123   | 343        | 14            | 0         | 179    | 686     |
| LF Mentorship  | 2         | 125   | 312        | 3             | 0         | 255    | 390     |
| LF Mentorship  | 3         | 141   | 97         | 25            | 0         | 993    | 5479    |
| OPW internship | 4         | 167   | 2394       | 104           | 0         | 126    | 98      |
| LF Mentorship  | 4         | 174   | 321        | 130           | 0         | 1262   | 4038    |
| OPW internship | 5         | 215   | 2352       | 58            | 0         | 225    | 1086    |
| LF Mentorship  | 4         | 245   | 181        | 19            | 0         | 160    | 429     |
| LF Mentorship  | 4         | 247   | 498        | 24            | 0         | 67     | 93      |
| LF Mentorship  | 3         | 265   | 108        | 5             | 0         | 58     | 186     |
| LF Mentorship  | 5         | 272   | 184        | 25            | 0         | 1839   | 2738    |
| Outreachy      | 5         | 273   | 802        | 21            | 0         | 32     | 64      |
| LF Mentorship  | 6         | 305   | 575        | 23            | 0         | 1508   | 7737    |
| LF Mentorship  | 3         | 309   | 120        | 15            | 0         | 42     | 0       |
| LF Mentorship  | 6         | 313   | 398        | 56            | 0         | 224    | 403     |
| LF Mentorship  | 4         | 333   | 144        | 10            | 0         | 57     | 169     |
| Outreachy      | 3         | 337   | 1141       | 27            | 0         | 403    | 1810    |
| OPW internship | 10        | 356   | 2537       | 242           | 0         | 798    | 1806    |
| OPW internship | 4         | 362   | 2517       | 99            | 0         | 196    | 285     |
| Outreachy      | 4         | 369   | 1302       | 72            | 0         | 137    | 174     |
| LF Mentorship  | 6         | 391   | 66         | 38            | 0         | 268    | 1053    |
| OPW internship | 4         | 404   | 2353       | 19            | 0         | 150    | 424     |
| LF Mentorship  | 7         | 427   | 261        | 71            | 0         | 5907   | 22444   |
| LF Mentorship  | 4         | 441   | 116        | 5             | 0         | 22     | 59      |
| OPW internship | 6         | 529   | 2592       | 40            | 0         | 857    | 2490    |
| Outreachy      | 6         | 537   | 767        | 354           | 0         | 1426   | 2141    |
| Outreachy      | 3         | 582   | 895        | 23            | 0         | 113    | 425     |
| Outreachy      | 4         | 605   | 393        | 47            | 0         | 218    | 317     |
| LF Mentorship  | 6         | 708   | 170        | 43            | 0         | 515    | 805     |
| OPW internship | 7         | 745   | 2164       | 64            | 0         | 805    | 2741    |
| LF Mentorship  | 7         | 947   | 90         | 12            | 0         | 38     | 302     |
| LF Mentorship  | 4         | 1082  | 344        | 11            | 0         | 41     | 70      |
| OPW internship | 11        | 1099  | 1813       | 91            | 0         | 292    | 517     |
| OPW internship | 11        | 1184  | 1346       | 37            | 0         | 219    | 593     |
| Outreachy      | 16        | 1189  | 129        | 212           | 0         | 3063   | 11282   |
| Outreachy      | 8         | 1299  | 1113       | 94            | 0         | 976    | 3132    |
| Outreachy      | 6         | 1323  | 1437       | 41            | 0         | 111    | 176     |
| OPW internship | 16        | 2315  | 560        | 75            | 0         | 479    | 1925    |

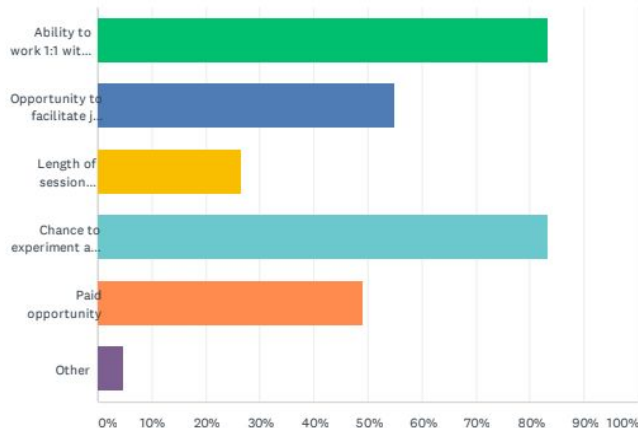# LINUX
# PLUMBERS
# CONFERENCE

Mentorship value ...

## Q4 Did a certain feature of the program make it stand out? (check all that apply)

Answered: 102    Skipped: 58



| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| Ability to work 1:1 with experienced open source contributors | 83.33% | 85 |
| Opportunity to facilitate jobs and internships | 54.90% | 56 |
| Length of session term/schedule | 26.47% | 27 |
| Chance to experiment and ability to learn to contribute effectively to current open source projects | 83.33% | 85 |
| Paid opportunity | 49.02% | 50 |
| Other | 4.90% | 5 |
| Total Respondents: 102 | | |

| # | OTHER | DATE |
|---|---|---|
| 1 | Emphasis on support for students and developers that are completely new to open-source. | 6/10/2021 12:59 PM |
| 2 | Chance to get involve in great community & projects | 5/31/2021 6:34 AM |
| 3 | Specifically relevant to what it is I'm doing | 5/30/2021 4:27 AM |
| 4 | Awesome variety of projects | 5/29/2021 4:40 AM |
| 5 | Mentorship provided | 5/28/2021 11:29 PM |

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# DISCUSSION

Kernel maintainers are not scaling is a known concern,  can expanding the diversity of maintainers participating improve the situation?

- What rewards will motivate more developers to volunteer?
- Are there some best practices for on ramping / training developers to be maintainers?
- What will help to continue to improve kernel quality over time?

# DISCUSSION

How create incentives for developers from diverse communities to participate ongoing basis?

- Engagement beyond day job, how to make it fun/satisfying?
- What should be tried next?

# DISCUSSION

We've seen a decline of the hobbyists / students participating (aka Ad hoc Contributors)

- How can we make working on the kernel more fun than writing an app for the iphone?
- How make kernel friendly for drive by contributors, and evolve them into maintaining code

# Thank You!

Thank you for your interest and participation.

Anyone else have further questions?