

# Closing the Gap: Aligning Developers' Expectations and Users' Practices in Cloud Computing Infrastructure

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Developers of Cloud Infrastructure for Computing Platform (CICP), a national cyberinfrastructure system for scientific computing, encounter different user practices than what they hope for. How can we change this?

## Users build clouds for free with CICP nodes. Developers expect users to:

- 1) Return nodes immediately after they finish working with them;
- 2) Not reserve nodes in excess.

## We observed examples of anti-normative behavior:



"[We] try to have that node until the end because we know that....unless the paper is submitted, we know that we might need it."



"[I] push in as many reservations as I can."

## This behavior is often learned locally from:

- 1) Research labs: New users learn lab practices from PIs, professors, advisors, and labmates.
- 2) Classrooms: Students follow course instructions to learn CICP; the course instructor is the primary learning resource.
- 3) Other similar systems: Some users applied their knowledge of similar systems they were familiar with, continuing their practices on CICP.

## The literature and our data suggest solutions:

Clear standards can be used to align user behavior with developers' expectations.

Establish standards through docs, mailing-list content, key actors, classroom instructions, and in contrast to other systems.

- Conclude emails with behavioral reminders
- Identify key actors at sign up
- Train the trainer
- Highlight system differences

Results obtained through observation and 15 semi-structured user interviews.

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