NS-3 Consortium

Annual Meeting

NS-3 Annual Meeting
June 24, 2022
Agenda

• Consortium overview
  – History, structure, membership, budget
  – Advisory Board
  – Recent activities and future plans
  – Q&A about the consortium

• Open source project status and discussion
  – Summary of recent project activity
  – Q&A/discussion about the open source project
WNS3 acknowledgments

- Thanks to Michele Polese, Yuchen Liu, and Eric Gamess, and our TPC, for WNS3 2022
  - No significant issues arose during WNS3 review process
  - Michele is completing a two-year term
- Thanks to tutorial leads Biljana Bojovic, Zoraze Ali, and Evan Black
- Hackathon: Tommaso Pecorella and Evan Black (MR !998)

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<th>Technical Program Committee Members</th>
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<tr>
<td>Ramon Aguero</td>
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<td>Hany Assasa</td>
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<td>Stefano Avalone</td>
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<td>Doug Bozarth</td>
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<td>Spyridon Masterakias</td>
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<td>Vedran Milotic</td>
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<td>Mohit Tahlilani</td>
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<td>Hajime Tajaki</td>
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<td>Thierry Turletti</td>
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<td>Tommaso Zugno</td>
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2022 WNS3 TPC
About the ns-3 Consortium

• Sustainment organization for the open source project
  – Officially organized as a University of Washington program

• Functions:
  – Handle funding and provide infrastructure for the project
  – Organize an annual workshop and meeting
  – Provide an interface for industrial and academic members to contribute and interact with the open source project
Current membership

• Founding Executive Members

• Executive Members

• Members
Classes of Consortium Members

• Class I Consortium Members:
  – For-profit entities with more than 500 employees
  – Annual Dues: $15,000

• Class II Consortium Members:
  – For-profit entities with 20 or more and less than 500 employees
  – Annual Dues: $7,500

• Class III Consortium Members:
  – For-profit entities with less than 20 employees
  – Annual Dues: $1,500

• Class IV Consortium Members:
  – Non-Profit Organizations, governmental organizations, and U.S. Federally Funded Research and Development Centers (FFRDCs)
  – Annual Dues: $1,500
Current Advisory Board

- Tom Henderson (Director, University of Washington)
- Sumit Roy (Associate Director, University of Washington)
- Walid Dabbous (INRIA)
- Sandra Lagen (CTTC)
- Manuel Ricardo (INESC TEC)
- Doug Blough (Georgia Institute of Technology)
- Mohit Tahiliani (NITK Surathkal)
- Xiaojun Hei (Huazhong University of Science and Technology)
- Greg White (CableLabs)
Member activities and interests

Brief overview of the technical agenda for Advisory Board members

- University of Washington
- INRIA
- Georgia Tech
- CableLabs
- INESC TEC
- HUST
- CTTC
- NITK Surathkal
2021-22 meetings

• All meeting minutes posted on the main ns-3 web server
  – Sept. 29, 2021: WNS3 2022 planning, WiGig software work, member updates on activities
  – Feb. 8, 2022: WNS3 2022/23 planning, WiGig software work
  – Apr. 1, 2022: OMNeT++ vs. ns-3 for simulating industrial networks, INRIA plans for the EU SLICES program
Budget status

• Consortium raises small amounts of funding to pay for annual meeting, low-cost infrastructure/services, and software development

• Income sources
  – Consortium membership fees
  – WNS3 registration fees (usually set low, to cover costs)

• Consortium accounts currently hold roughly $9,000 (through June 2022)
  – After current obligations, $7,000 remaining
Current activities

• Contracted software development
  – Refactoring of wifi module to allow WiGig module to exist in a separate module
  – Work performed by Sebastien Deronne
  – Technical reports available at: https://www.nsnam.org/consortium/activities/software/

• Training
  – Wi-Fi overview (Tom Henderson and Hao Yin), ACMSE Conference, 2022
  – Past annual meetings (through 2019) offered two days of basic (and advanced topic) training
Other Consortium expenditures

• Hardware and software infrastructure
  – Vimeo subscription for ad-free video hosting
  – Virtual machine software for Jenkins test infrastructure
  – Workstations at University of Washington (in past years)
  – Website design/maintenance (in past years)

• ACM Digital Library fees for WNS3

• Travel support to annual meeting (in past years)
Consortium next steps

• Discussing return of in-person meeting in 2023
  – Washington DC is being considered
• Tutorial/educational improvements and online (updated) basic training

Questions?
Open source project status
Open source project highlights

• Two releases (ns-3.35, ns-3.36) since last June
• Three students in Google Summer of Code 2021 completed projects in September
• Google Summer of Code 2022 awarded us three students
  – **Org. admins:** Tommaso Pecorella, Mohit Tahiliani
  – **Mentors:** Mohit Tahiliani, Bhaskar Kataria, Vivek Jain, Sandra Lagen, Biljana Bojovic, Michele Polese, Tommaso Pecorella, Ameya Deshpande, and Manoj Kumar Rana
  – One supplemental ns-3 summer of code (NSOC) program
Code statistics and maintainer commits

Since last annual meeting (June 19, 2021)

• **176 commits** by **39 authors**

• **Maintainer commits** from
  – Alexander Krotov, **Ameya Deshpande**, Biljana Bojovic, **Gabriel Ferreira**, Mohit Tahiliani, Peter Barnes, **Sandra Lagen**, Sebastien Deronne, Stefano Avallone, Tom Henderson, Tommaso Pecorella, Zoraze Ali

• **159,000 lines** of C++ code added/deleted (ns-3-dev)
  – parsed output of git diff --stat filtered for {.cc,h}
  – 114,000 lines due to wifi module and wireless examples

• **330 Merge Requests** opened

• **196 Issues** filed
Software in the Public Interest (SPI)

- ns-3 also joined the SPI umbrella organization in 2020 ([https://www.spi-inc.org](https://www.spi-inc.org))
  - Current budget balance $1140

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Funded project priorities

• Scalable wireless simulations (NSF Award, University of Washington and Georgia Tech)
• Wi-Fi 7 models (802.11be aspects)
• NR V2X-based public safety models and scenarios
Technical progress summary

• Wi-Fi and 5G cellular models continue to develop at a rapid pace
• IoT-related contributions are heating up
• CMake build system replaced Waf
• Making use of GitLab.com CI system
• Software cleanup and C++ evolution
• NetSimulyzer progress
Areas of concern

- Tutorial and examples could use modernization and cleanup
  - Overall ease of use improvements
  - More hands-on opportunities for tutorials/training
  - Technology-specific tutorials
- App store contributions and maintenance have dropped off
- Python bindings are no longer supported
  - cppyy integration is a work in progress
- Emulation is not being tested or improved upon
- We ought to define how ns-3 should be packaged by others
- Managing the incoming workflow of patches and issues
Results of small survey of OS

- Recent survey responses (40 users)

Answered: 40  Skipped: 0

macOS
Windows
Subsystem fe...
Ubuntu
MX Linux
EndeavourOS
Manjaro
RHEL (Red Hat)
Fedora
Docker (also please specify)
Other (can list multiple)
Near term goals (Tom)

- DCE 1.12/1.13 releases (modern Linux kernel) -- with Parth
- Better Windows support -- Gabriel
- Installation guides (move from wiki to Sphinx documentation)
- Reorganize ns-3-allinone release (see next slide)
- Migrate one or more modules to the app store (wimax, others...)
- Rework tutorial and examples -- with Mohit, Doug, others?...
- Automate our style checking/linting -- Eduardo
- Python bindings via cppyy? *(volunteer needed)*
- Otherwise... work on tracker issues and incoming MRs

*Antoine de Saint-Exupéry*: 'A goal without a plan is just a wish.’
ns-3-allinone reorganization

• ns-3-allinone was carried over from ns-2-allinone

• Historically, has contained some build scripts, ‘bake’ build system, ‘pybindgen’, ‘netanim’, and ‘nsc’

• Possible option:
  – Some time (~1 month) after publishing ns-3.x release, publish ns-allinone-3.x release
  – Include all compatible modules from the app store in the contrib/directory
  – Replace build.py and dist.py with bake.py
  – Bundle selected third party tools/libraries of high community interest (netsimulyzer, netanim)
  – Ensure bake compatibility with other libraries (e.g. ns-3-dce components)
Summary

• Thanks to all who have built and continue to care for ns-3
• Maintenance help will always be needed and appreciated
  – Great job by a small maintainer team in the past year
  – Nice to see many new contributors this year
• Consortium members wanted
  – Funding and industrial participation is needed for sustainment
  – Email: consortium@nsnam.org
• Apps wanted
  – Help us populate the app store (https://apps.nsnam.org)
Questions or comments about the consortium or open source project?