Wheel-Next: Red Hat PoV

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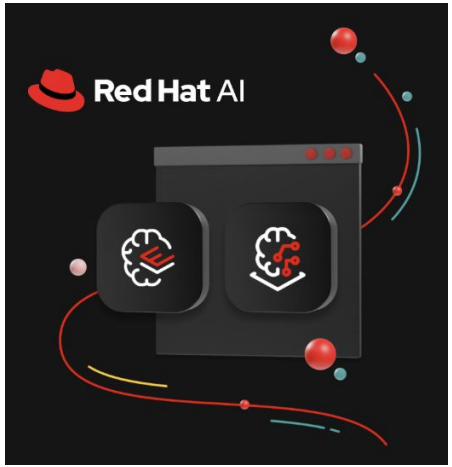
Red Hat

Do you think python is on the right path for GenAI?

If not, why not?

If so, why are we here?

Background and why Red Hat is here



- Red Hat is growing an AI portfolio.
  - Diverse-hardware strategy for accelerators
  - Enterprise lifecycle
  - Partner-centric strategy
  - Working with Quansight
- Products: RHEL AI & OpenShift AI & some IBM SaaS offerings & IBM Spyre
- Shipping Python packages as wheels in a venv, non-Python packages as RPMs

Rebuilding all packages from source

- **For technical and security reasons, we build all wheels we ship from source**
- Fromager is the tool we use to build a whole dependency tree as wheels
- Obtaining sources is sometimes challenging without sdists uploaded on PyPI
  - Andrew James from QS got us in touch with atalman about triton

Main challenges

- Python packaging has no awareness of accelerators
  - Needing multiple indexes for CUDA, ROCm, oneAPI wheels is cumbersome
  - No accelerator-aware installer
  - **We would like to be able to install certain wheels based on metadata we provide.**

- Achieving build hermeticity requires patching/workarounds in many Python packages
  - Ex.: packages unconditionally rely on CMake, which bypasses our system CMake
  - Ex.: packages invoke Make from within setup.py to download and build a shared library

Looking forward to adopting: wheel variants

- We have worked around the issues by running a **wheel index server for each hardware platform**
- The ability to store all wheels in a single index server and `pip install pkgname` doing the right thing will lower our maintenance & development costs

Note that we do not rely on PyPI, so we don't need PyPI-focused WheelNext proposals for RHEL AI, however we do recognize the value to the community and are supportive of the initiative.

Top 3 “works well”

- PEP 517 adoption & build backends: moving from custom setup.py to CMake, Meson. Yields faster & more reliable builds, easier to debug.
- Focus on static metadata & security - SPDX license expressions, trusted publishing
- Venv-based deployment

Top 3 “needs improvement”

- Making Python packages easier to consume for a distro:
  - **Allow using system libraries** ← vLLM
  - Don’t download anything during builds or test suite run
  - Don’t vendor other packages if you can avoid it
  - Tagging releases, providing sdists on PyPI or GitHub Releases
- Python packaging standards and tools got a lot better, but many (most?) packages don’t use them

WheelNext initiative & our planned contributions

- We plan to contribute by:
  - Sharing our use cases
  - Testing wheel variant prototypes
  - Supporting PEP discussions on the packaging Discourse
  - Any other asks that come our way and we may be in a position to help

Closing thoughts

- We see the WheelNext initiative as a **shared, community concern**, where a complete solution will reduce all our technical debt and maintenance burdens which multiply with each accelerator.
- It is also a way of moving the state of Python packaging forward, to where **RH can support AI stacks more seamlessly and fluidly as the ecosystems (plural) evolve.**