

## Metall Paper Critique

Mahmoud Moustafa

3648276

The paper [1] presents Metall, a persistent memory allocator, and its evaluation against existing memory management systems, such as Boost.Interprocess and memkind (PMEM kind). The focus of the paper is to address the need for persistently storing data beyond the single process lifecycle and provide a solution that can handle data analytics effectively.

The key ideas and contribution of Metall are its use of NVRAM, memory-mapped file mechanism, and support for persistence and snapshots. These features make it a promising solution for persistently storing data in NVRAM and provide efficient memory management, as well as a snapshot feature.

The primary result of the evaluation shows that Metall outperforms Boost.Interprocess and PMEM kind in terms of performance, especially on the EPYC machine, where Metall significantly outperforms the other two with improvement factors ranging from 7.4 to 10.9x and 2.2 to 2.8x, respectively, at different graph sizes. The comparison of Metall's performance on the EPYC and Optane machines highlights its high portability, with reference to the design strategies from Supermalloc providing credibility to the explanation of the results.

However, Metall has some limitations that need to be addressed. One limitation is that it only supports single process use and is not designed for multi-process data sharing. Another limitation is the restriction of references, virtual functions, and virtual base classes in persistent memory. Further research is needed to improve its compatibility with various data structures and address these limitations.

In conclusion, Metall is a promising solution for persistently storing data in NVRAM and provides efficient memory management and a snapshot feature. The results of the evaluation show that it outperforms existing memory management systems and highlights its high portability. However, there are limitations that need to be addressed in future research to further improve its compatibility with various data structures.

### References:

[1] Keita Iwabuchi et al. Metall: A persistent memory allocator for data-centric analytics. *Parallel Computing*, Volume 111, July 2022, 102905