**Enhancements over the original PGAS14 conference version**

In our earlier work presented at PGAS 2014, we introduced modulo unrolling without unrolling (WU), a method to perform message aggregation across parallel affine loops with data distributed cyclically and block-cyclically on message passing architectures. More specifically, our method was a traditional compiler transformation, applicable to any PGAS language, which improves the communication and runtime performance of a loop that frequently accesses remote memory. In addition, we also described how modulo unrolling WU was implemented into the Chapel PGAS language. In this work, we have extended the original PGAS 2014 paper content in the following directions:

1. We’ve added a strong scaling evaluation of modulo unrolling WU to our results for a subset of our benchmark suite, which is found in Section 8.2.
2. We’ve added a weak scaling evaluation of modulo unrolling WU to our results for a subset of our benchmark suite, which is found in Section 8.3.
3. We’ve added a block size variation evaluation of modulo unrolling WU to our results as it applies to the Chapel Block Cyclic distribution, which is found in Section 8.4.
4. We’ve modified our existing results (Section 8.1) to explain why certain benchmarks in our benchmark suite saw a greater performance increase in runtime and message count than others.
5. We describe our Chapel implementation of modulo unrolling WU for the Block Cyclic distribution in greater detail in Section 7.3 with pseudocode (and explanation) from the Block Cyclic leader iterator.
6. We provide clearer explanations in Section 7.3 of how the leader and follower iterators for both the Cyclic and Block Cyclic distributions carry out each step of the compiler transformation theorized in Section 6.
7. We’ve improved the introduction section to make it clearer that our paper contributes a compiler transformation applicable to any PGAS language as well as an implementation specifically for the Chapel programming language.

As a result of the changes above, the length of the paper increased from 12 pages for the conference version, to 17 pages for the journal version, when both are formatted in the format of the conference for consistency.