# Profile Guided Source Coding in Compiler Optimization

Chenhao Wu
School of Science and Engineering
The Chinese University of Hong Kong, Shenzhen, China

**Abstract**

In order to best utilize the run-time memory occupancy and to give powerful and intensive memory-consumption applications with higher compatibility on mobile and embedded systems, we proposed a compiler optimization, Profile Guided Source Coding (PGSC), which is led by the compilation process and aims to reduce the run-time memory occupancy of compiled programs. The optimization of PGSC is based on a profile generated by sample runs on the initially compiled executable, and the profile entails the access (load/read) frequencies on the allocated memory blocks performed by the program during run-time. Our strategy is during the compilation the memory accessing instructions of the program will be substituted by compress and decompress instructions, such that the memory blocks with lower frequency will be compressed into a compressed area when idled and will be decompressed into a run-time area when they are to be loaded. To achieve this objective we apply the Lempel-Ziv coding on the compression process and artificially selected several sample programs as the benchmark to examine the performance of programs compiled with PGSC optimization. The experiment shows that after applying PGSC optimization the average memory occupancy (AMO) and the maximum memory occupancy (MMO) of the identical program are decreased. Even though it would also bring an additional overhead in distributing the computing resources in run-time compression and decompression, the experiment shows this optimization is considerable in practice. In future, we will research on the combination of the PGSC optimization and the distributed cache system, and also to investigate the capability of combining PGSC optimization with contemporary channel coding schemes.