**Prof. Edward Kohler**

**Budget Justification**

**Senior personnel:**

Edward Kohler (Co-PI) requests one month of a supplemental month of salary in each year, with one month being equal to 1/9 academic year salary. In accordance with historical University salary practices, this amount is increased by 4% at the start of each new fiscal year (July 1).

The University pays salary to full-time faculty members based on a nine-month academic year, with the understanding that they will ordinarily teach and conduct research freely and flexibly, and not make substantial, specific quantified cost-sharing commitments of time and effort to specific organized research projects.

**Other personnel:**

Graduate Students: Salary is requested for 1.5 full-time graduate students in all years of the grant, starting at the G2 (second-year) level. For G2 (second-year) students, the monthly salary paid from sponsored projects is reduced in proportion to the time spent on a one-time teaching fellowship requirement. The rate used for sponsored budgeting represents the monthly average of the aggregate salary paid to a G2 for research in a calendar year. For G3’s and above, the rates used represent full-time effort on research.

In Year One, the starting salary requested for the G2 student is $26,820 ($2,235 per month), which is projected to be the standard SEAS graduate salary rate in FY14. The G3 rate in FY15 is $2,820 per month. In accordance with historical University salary practices, this amount is increased by 4% each year.

Fringe Benefits: for SEAS personnel, fringe benefits are calculated in all years at 27.3% for the Senior Personnel, per Harvard’s IDC Agreement with DHHS dated 05/10/12.

**Travel:**

Travel: $3,000 per year is requested for domestic travel to topical conferences, and $2,000 per year for international travel to topical conferences and meetings. This will enable dissemination of research progress, community building, and collaboration (e.g., HotPar, SOSP, OSDI, etc.). We propose domestic and foreign travel support to help defray travel costs for the project team to attend these meetings. Funds requested are based on recent actual costs, using the lowest available coach airfare, reasonable lodging costs, ground transportation, and meal per diem, as well as any applicable conference registration fees (which range between $300 and $800+ per person per conference).

**Equipment:**

$19,889 is requested in year one to add necessary compute equipment to the Harvard clusters used in our work. Although the Computing@SEAS group has computing cluster infrastructure we will also use (as detailed in Facilities and Other Resources), most of this infrastructure is shared with other users and/or accessed using virtualization technology. Some of our work can use this shared infrastructure, but for much of our work, particularly kernel development, direct access to a modern multi-core machine, (including the ability to run new operating systems) is essential. A quote of $19889 was obtained from ServersDirect for a 4-node server. The chassis is a 2U Quanta S810-X52L-2 containing 4 compute nodes, each with 6 hard disks (facilitating our key-value store work). Each node runs 2x 8-core Intel XEON E5-2660 2.2GHz and has 64GB of DRAM (8x Kingston KVR16R11D4/8I). We also request 3 years of warranty.

**Other Direct Costs**

**Materials and Supplies:**

Funds are requested in Year 1 for the purchase of two computer workstations with related components such as monitors, peripherals, cables, software such as VMware, and so forth. These will be used exclusively as programming workstations for the project’s graduate students. Other materials and supplies are foreseen throughout the project, including network equipment for the compute equipment requested above.

**Other – Graduate Student Tuition:**

Per Harvard policy, graduate student tuition is budgeted separately from salary at the same level of effort, and is non-overhead bearing. Tuition is calculated, using SEAS’s projected standard rates, as follows:

Year One: $1,019/mo. x 11 mo. x 1.5 students (G2) + $1,160/mo. x 1mo. x 1.5 students (G3)

Year Two: $1,160/mo. x 11 mo. x 1.5 students (G3) + $1,206/mo. x 1mo. x 1.5 students (G4)

Year Three: $1,206/mo. x 11 mo. x 1.5 students (G4) + $544/mo. x 1mo. x 1.5 students (G5)

Year Four: $544/mo. x 11 mo. x 1.5 students (G5) + $566/mo. x 1mo. x 1.5 students (G6)

For G2 (second-year) students, tuition remission requested is commensurate with the percentage of salary covered for research activities on a given project, which is traditionally reduced to accommodate a semester-long teaching fellowship requirement.

**Indirect Costs:**

Overhead is calculated on a modified total direct cost basis (tuition is overhead-exempt) at 69% in all years, per Harvard’s IDC Agreement with DHHS dated 5/10/12.