The Indiana University High Energy Physics group is seeking a software developer to work on the File Transfer System (FTS) doing development and operations using Linux, C++, and MySQL. FTS is used by the ATLAS project at CERN to transfer petabytes of data each day to and from participating sites around the world. The developer will also spend 25% of their time doing system administration for the Midwest Tier 2 Center (MWT2). While the position will be based in Bloomington, day trips to Indianapolis will be occasionally required. Fuller details about the position can be found starting on page 2.

The website used to apply for the position is brand new and may have problems. Please be aware that:

1. If the direct links below fail to open the position listing, please search for position 296598. NB: Please ignore an earlier version of the listing for this job (296148) which will be removed.
2. Currently the website restricts the official posting to be mostly a predefined generic description of a software developer for scientific research. Please refer to this document for a more complete description of what the hired person will actually be expected to do.

Please contact luehring@indiana.edu with questions or for assistance with the application process.

Directions on how to apply:

1. Non-IU employees should click on the first link below to access the careers site; current IU employees should click on the second link below.
2. Review the job description and then click on "Apply for Job" to begin your application.
3. Non-IU employees will need to sign in to access your account. If you do not already have an account, click on "Register Now" to create an account. Current IU employees will be recognized through CAS Authorization.
4. Complete the application process.

If you are NOT an IU employee currently, please use the following link:

https://hrms.indiana.edu/psp/PH1PRD_PUB/EMPLOYEE/HRMS/c/HRS_HRAM_FL.HRS.CG_SEARCH_FL.GBL?Page=HRS_APP_JBPST_FL&Action=U&FOCUS=Applicant&SitId=1&JobOpeningId=296598&PostingSeq=1

Current IU employees should use this link:

https://hrms.iu.edu/psp/PH1PRD/EMPLOYEE/HRMS/c/HRS_HRAM_EMP_FL.HRS.CG_SEARCH_FL.GBL?Page=HRS_APP_JBPST_FL&Action=U&SitId=1&FOCUS=Employee&JobOpeningId=296598&PostingSeq=1
A. Primary Role:

This position works on software and computing for the ATLAS High Energy Physics (HEP) experiment at CERN’s Large Hadron Collider (LHC). The primary role is software development for the CERN File Transfer Service (FTS) open-source software used to make reliable, large scale data transfers (https://fts.web.cern.ch/fts/). Currently ATLAS uses the FTS system to transfer 1-5 PB of data per day between ~90 institutions and the programming work will focus on improving the performance and reliability of those FTS transfers. The code base is written in C++ and requires using the MySQL database that ATLAS FTS is built on. Additionally, there will be operational work monitoring the FTS distribution of ATLAS data to find and resolve transfer issues worldwide. This operational work will be very useful in understanding how to improve the performance of the FTS code. The final part of the work will be system administration for ~230 Dell rack mounted servers belonging to the Midwest Tier 2 Center (MWT2). The servers are located at IU’s Indianapolis campus and while the administration work is largely remote, several visits per month to Indianapolis will be required.

CERN is the largest international particle physics laboratory and is located near Geneva, Switzerland. The work will be for the ATLAS project, one of two general purpose particle detectors at CERN’s Large Hadron Collider. HEP studies the basic nature of the universe and has developed and confirmed the spectacularly successful Standard Model of particles and interactions. The position is at the Indiana University Bloomington campus and is with the Physics Department’s High Energy Physics (HEP) group which has conducted research at CERN since 1989.

B. Primary Duties and Responsibilities:

50% Software development for the CERN File Transfer Service (FTS) open-source software used to make reliable, large scale data transfers (https://fts.web.cern.ch/fts/). Currently the ATLAS project uses the FTS system to transfer 1-5 PB of data per day between ~90 institutions. The software development is on Linux systems, using a codebase written in C++. Familiarity with Python is required since it is used in other portions of the FTS code. The work requires understanding of high-speed networking, large, distributed storage systems, and scheduling algorithms. Familiarity with databases (Oracle/MySQL or just SQL) and data transfers is required as the backend database is written in MySQL.

The work will focus initially on improving the aggregated performance (maximizing the total amount of data transferred) between the ATLAS sites throughout the world. Later work will help ensure that the various storage systems used at the FTS sites achieve maximum performance. Other areas of work include improving the FTS Quality of Service (QoS) features and adding redundancy to FTS to ensure reliable data transfers.

25% Operational work monitoring the distribution of ATLAS data to find and resolve issues worldwide. Currently most of the data distribution monitoring is done in Europe. The person hired for this position will provide coverage in North American time zones.

25% System administration work on ~230 Dell rack mounted servers belonging to the Midwest Tier 2 Center (MWT2) that are located at IU’s Indianapolis campus. The work is largely done remotely, but
some visits to the Indianapolis site will be required. Typical tasks include updating Linux and other software, finding and fixing problems, and installing new equipment.

The FTS work will be in collaboration with the University of Michigan, Brookhaven National Laboratory, and the CERN IT Division Storage Group. The system administration work will be in collaboration with the University of Chicago, the University of Illinois, and the US ATLAS computing and software project. Some travel within the US and possibly overseas is required. Will likely need to remotely join meetings scheduled in central European time zone (CET) which is 6 hours ahead of EST.

C. Qualifications:

Required Education:

• Bachelor's degree (preferably in computer science or a related field).

Preferred Education:

• Degree in computer science, physics, or a related field.
• Master's degree.

Required Experience:

• Two years of programming experience

Preferred Experience:

• Experience/demonstrable proficiency with high-speed networks, networking software, and large-scale storage.
• Experience with offline computing in a scientific setting ideally in high energy physics.
• Experience with operating servers, storage, and networks.

Required knowledge, skills, and abilities:

• Understanding of computer networking and large storage systems.
• Proficiency programming in C++ and familiarity with Python.
• Familiarity with Oracle/MySQL (or just SQL) and database application development.
• Demonstrable proficiency with Linux/UNIX (verified by testing).
• Experience developing software for Linux using git, CMake, gcc, etc.
• Basic knowledge of computer server hardware.
• Ability to lift 50 pounds and work standing up for an hour.

Preferred knowledge, skills, and abilities:

• Knowledge of large-scale data processing.
Knowledge of storage platforms e.g., CEPH, GPFS, Lustre, dCache, or XRootD.
Knowledge of X.509 and/or token authentication.
Knowledge of grid computing.

Required Equipment utilized:

- Computer servers (e.g. Dell, HPE, SuperMicro etc.)

Preferred Equipment utilized:

- Network switches and server network interface cards (e.g., Broadcom, Brocade, Cisco, Dell, Intel, Juniper, Mellanox).
- Large disk arrays / storage systems (e.g., EMC, JBOD, HPSS, IBM, Infiniband)