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- [73] Chen MY, Accardi A, Kiciman E, Jim L, Dave P, Armondo F, Eric B. Path-based failure and evolution management. In: *Proc. of the 1st Conf. on Symp. on Networked Systems Design and Implementation*. USENIX Association, 2004. 23.
- [74] Kavulya SP, Daniels S, Joshi K, Matti H, Rajeev G, Priya N. Draco: Statistical diagnosis of chronic problems in large distributed systems. In: *Proc. of the IEEE/IFIP Int'l Conf. on Dependable Systems and Networks (DSN 2012)*. IEEE, 2012. 1–12.
- [75] Yuan D, Mai HH, Xiong WW, *et al.* SherLog: Error diagnosis by connecting clues from run-time logs. *ACM SIGARCH Computer Architecture News*, 2010, 143–154.
- [76] Wang C, Kavulya SP, Tan J, Liting H, Mahendra K, Mike K, Karsten S, Priya N, Rajeev G. Performance troubleshooting in data centers: An annotated bibliography. *ACM SIGOPS Operating Systems Review*, 2013,47(3):50–62.
- [77] Luo C, Lou JG, Lin Q, Qiang F, Rui D, Dongmei Z, Zhe W. Correlating events with time series for incident diagnosis. In: *Proc. of the 20th ACM SIGKDD Int'l Conf. on Knowledge Discovery and Data Mining*. ACM, 2014. 1583–1592.
- [78] Chen P, Qi Y, Hou D. CauseInfer: Automated end-to-end performance diagnosis with hierarchical causality graph in cloud environment. *IEEE Trans. on Services Computing*, 2016,12(2):214–230.
- [79] Chen P, Qi Y, Zheng P, Di H. Causeinfer: Automatic and distributed performance diagnosis with hierarchical causality graph in large distributed systems. In: *Proc. of the IEEE INFOCOM & IEEE Conf. on Computer Communications*. IEEE, 2014. 1887–1895.
- [80] Zhang L, Bild DR, Dick RP, Mao ZM, Peter D. Panappticon: Event-based tracing to measure mobile application and platform performance. In: *Proc. of the Int'l Conf. on Hardware/Software Codesign and System Synthesis (CODES+ISSS)*. IEEE, 2013. 1–10.
- [81] <http://incubator.apache.org/projects/htrace.html>
- [82] Alawneh L, Hamou-Lhadj A. Execution traces: A new domain that requires the creation of a standard metamodel. In: *Proc. of the Int'l Conf. on Advanced Software Engineering and Its Applications*. Springer-Verlag, 2009. 253–263.



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