the 10th USENIX Conference on Operating Systems Design and Implementation, 2012.

[4] V. Chandola, A. Banerjee, and V. Kumar. Anomaly detection: A survey. *ACM Comput. Surv.*, 41(3), 2009.

[5] C. Chen and L.-M. Liu. Joint estimation of model parameters and outlier effects in time series. *Journal of the American Statistical Association*, 88(421):284–297, 1993.

[6] M. Y. Chen, E. Kiciman, E. Fratkin, A. Fox, and E. Brewer. Pinpoint: Problem determination in large, dynamic internet services. In *Proceedings of the 2002 International Conference on Dependable Systems and Networks*, 2002.

[7] Amazon cloud watch, 2016. `https://aws.amazon.com/cloudwatch` [Accessed Sep 2016].

[8] G. Da Cunha Rodrigues, R. N. Calheiros, V. T. Guimaraes, G. L. d. Santos, M. B. de Carvalho, L. Z. Granville, L. M. R. Tarouco, and R. Buyya. Monitoring of cloud computing environments: Concepts, solutions, trends, and future directions. In *Proceedings of the 31st Annual ACM Symposium on Applied Computing*, 2016.

[9] Datadog: Cloud monitoring as a service, 2016. `https://www.datadoghq.com` [Accessed Sep 2016].

[10] D. J. Dean, H. Nguyen, P. Wang, and X. Gu. Perfcompass: Toward runtime performance anomaly fault localization for infrastructure-as-a-service clouds. In *Proceedings of the 6th USENIX Conference on Hot Topics in Cloud Computing*, 2014.

[11] Dynatrace: Digital performance management and application performance monitoring, 2016. `https://www.dynatrace.com` [Accessed Sep 2016].

[12] R. Fonseca, G. Porter, R. H. Katz, S. Shenker, and I. Stoica. X-trace: A pervasive network tracing framework. In *Proceedings of the 4th USENIX Conference on Networked Systems Design & Implementation*, 2007.

[13] App Engine - Run your applications on a fully managed PaaS, 2015. `https://cloud.google.com/appengine` [Accessed March 2015].

[14] Google Cloud SDK Service Quotas, 2015. `https://cloud.google.com/appengine/docs/quotas` [Accessed March 2015].

[15] U. Groemping. Relative importance for linear regression in r: The package relaimpo. *Journal of Statistical Software*, 17(1), 2006.

[16] Q. Guan, Z. Zhang, and S. Fu. Proactive failure management by integrated unsupervised and semi-supervised learning for dependable cloud systems. In *Availability, Reliability and Security (ARES), 2011 Sixth International Conference on*, 2011.

[17] O. Ibidunmoye, F. Hernández-Rodriguez, and E. Elmroth. Performance anomaly detection and bottleneck identification. *ACM Comput. Surv.*, 48(1), July 2015.

[18] H. Jayathilaka, C. Krintz, and R. Wolski. Response time service level agreements for cloud-hosted web applications. In *Proceedings of the Sixth ACM Symposium on Cloud Computing*, 2015.

[19] A. Keller and H. Ludwig. The WSLA Framework: Specifying and Monitoring Service Level Agreements for Web Services. *J. Netw. Syst. Manage.*, 11(1), Mar. 2003.

[20] R. Killick, P. Fearnhead, and I. A. Eckley. Optimal detection of changepoints with a linear computational cost. *Journal of the American Statistical Association*, 107(500):1590–1598, 2012.

[21] O. Kononenko, O. Baysal, R. Holmes, and M. W. Godfrey. Mining modern repositories with elasticsearch. In *Proceedings of the 11th Working Conference on Mining Software Repositories*, 2014.

[22] C. Krintz. The appscale cloud platform: Enabling portable, scalable web application deployment. *IEEE Internet Computing*, 17(2), 2013.

[23] Latency is Everywhere and it Costs Your Sales, 2009. `http://highscalability.com/latency-everywhere-and-it-costs-you-sales-how-crush-it` [Accessed Sep 2016].

[24] G. R. Lindeman R.H., Merenda P.F. *Introduction to Bivariate and Multivariate Analysis*. Scott, Foresman, Glenview, IL, 1980.

[25] J. a. P. Magalhães and L. M. Silva. Root-cause analysis of performance anomalies in web-based applications. In *Proceedings of the 2011 ACM Symposium on Applied Computing*, 2011.

[26] J. P. Magalhaes and L. M. Silva. Detection of performance anomalies in web-based applications. In *Proceedings of the 2010 Ninth IEEE International Symposium on Network Computing and Applications*, 2010.

[27] Microsoft Azure Cloud SDK Service Quotas, 2015. `http://azure.microsoft.com/en-us/documentation/articles/azure-subscription-service-limits` [Accessed March 2015].

[28] M. Natu, R. K. Ghosh, R. K. Shyamsundar, and R. Ranjan. Holistic performance monitoring of hybrid clouds: Complexities and future directions. *IEEE Cloud Computing*, 3(1), Jan 2016.

[29] New relic: Application performance management and monitoring, 2016. `https://newrelic.com` [Accessed Sep 2016].

[30] H. Nguyen, Y. Tan, and X. Gu. Pal: Propagation-aware anomaly localization for cloud hosted distributed applications. In *Managing Large-scale Systems via the Analysis of System Logs and the Application of Machine Learning Techniques*, 2011.

[31] D. Nurmi, R. Wolski, C. Grzegorczyk, G. Obertelli, S. Soman, L. Youseff, and D. Zagorodnov. The Eucalyptus open-source cloud-computing system. In *IEEE/ACM International Symposium on Cluster Computing and the Grid*, 2009.

[32] P. Pinheiro, M. Aparicio, and C. Costa. Adoption of cloud computing systems. In *Proceedings of the International Conference on Information Systems and Design of Communication*, 2014.

[33] M. Soni. Cloud computing basics—platform as a service (paas). *Linux J.*, 2014(238), 2014.