Of queues and cures: A solution to modelling the inter time arrivals of cloud outage events

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Background & Introduction

Background:

- Cloud outages come from multiple sources,
- High volume outages are a challenge for SME's,
- Which distribution can be used to model these events,
- If a distribution is known model development can follow.

Aim: understand which distribution can model outage events.

Complication: Outage events are highly dispersed.

- Test for Goodness of Fit,
- Check against known distributions,
- Distributions include: lognormal, gamma, Weibull,
- exponential, logistic, loglogistic and Pareto.

Dataset

The study examines 250 cloud outage events from a large enterprise system.

- Study looked at the inter arrival times of each outage,
- Data was collected over a 12 month period (January - December),
- The software running on this enterprise system was developed in Java,
- Developers follow a Continuous Delivery development model.

Our key research question:

- Which distribution can best model the inter arrival time of cloud outage events.

Analysis & Discussion

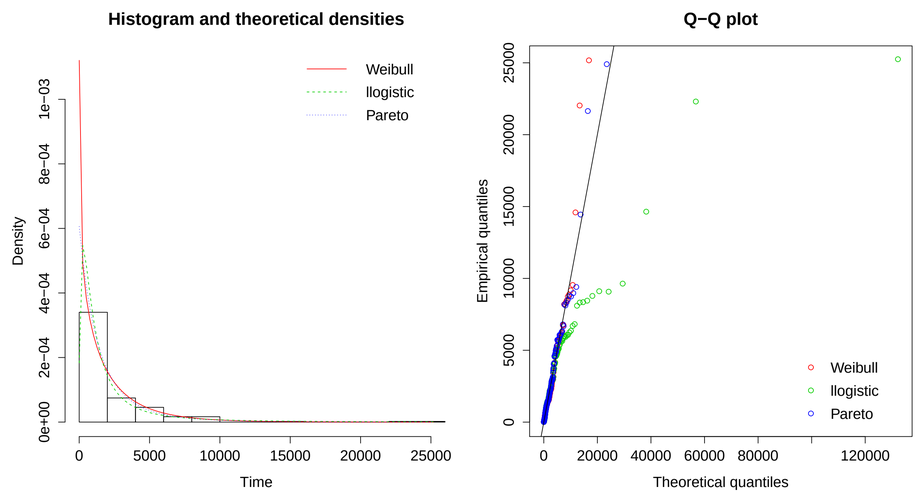
Method:

- Model the parameters of each distribution using the R fitdistrplus library,
- Test the GoF characteristics of each distribution using the ADGofTest library.

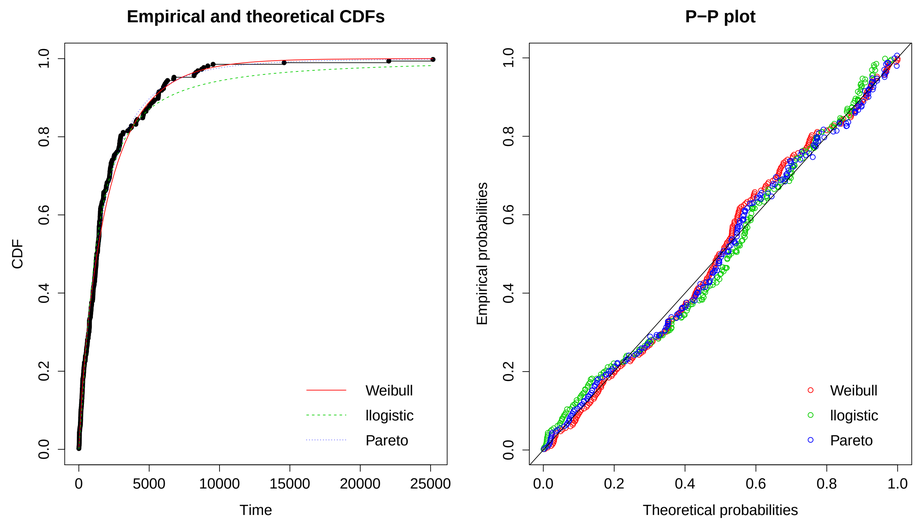
Table 1: Summary of Anderson-Darling GoF statistics.

Distribution Name	AD statistic	p-value
lognormal	3.039	0.026
gamma	6.034	9.347e-04
Weibull	0.975	0.371
exponential	3.110	0.024
logistic	12.819	2.765e-06
loglogistic	1.823	0.115
Pareto	0.661	0.592

Results: Histogram & Quantiles



Results: CDF & Probabilities



Conclusions, Future and Related Work

Conclusions:

- The Pareto distribution is an effective distribution for modelling the interarrival times of cloud outages.
- Result can be used as an arrival time parameter for a queuing model.

Future Work:

- Establish service time distribution.
- Queue simulation of inter arrival and service time distributions.

Related work:

- *Web Page https://cran.r-project.org/web/packages/fitdistrplus/index.html*, Delignette-Muller, M.L. and Dutang, C. and Pouillot, R. and Denis, 2015
- *Web Page https://cran.r-project.org/web/packages/ADGofTest/index.html*, Bellosta, C.J.G 2011