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Analysis of empty ATLAS pilot jobs and subsequent resource usage on grid sites

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The pilot model employed by the ATLAS production system has been in use for many years. The model has proven to be a success, with many
advantages over push models. However one of the negative side-effects of using a pilot model is the presence of 'empty pilots' running
on sites, consuming a small amount of walltime and not running a useful payload job. The impact on a site can be significant, with
previous studies showing a total 0.5% walltime usage with no benefit to either the site or to ATLAS. Another impact is the number of
empty pilots being processed by a site's Compute Element and batch system, which can be 5% of the total number of pilots being handled.
In this paper we review the latest statistics using both ATLAS and site data and highlight edge cases where the number of empty pilots
dominate. We also study the effect of tuning the pilot factories to reduce the number of empty pilots.

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