OPERATIONAL IMPLEMENTATION OF TIGGE/THORPEX PROGRAM IN THE CPTEC/INPE

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SUMMARY - The THORPEX (Observing-system Research and predictability experiment) is an international research program sponsored by the World Meteorological Organization. Its objective is to speed up improvements in forecasts from one day to two weeks (14 days). One of its main components is the TIGGE project (THORPEX Interactive Grand Global Ensemble). The TIGGE foresees the cooperation of international centers for the joint development of an ensemble forecast. The CPTEC/INPE is one of these international suppliers of data, providing the outputs from its operational ensemble weather forecast model. To evaluate the viability of the needed massive data transfer from CPTEC/INPE to the TIGGE archiving centers some data transfer tests had been carried out.

INTRODUCTION - One of the big challenges for the Meteorology in the century 21 is to improve the quality of the weather forecasts in order to effectively help in the prevention and mitigation of natural disasters, benefiting the society and economy. Established in May 2003 in the 14º congress of the WMO, the THORPEX is an international research and development program with duration of 10 years. Its objective is to speed up and to promote improvements in the forecasts from 1 to 14 days using techniques of probabilist ensemble weather forecast. As one of the main programs of the THORPEX, the TIGGE foresees the sharing of ensemble forecast model data from several operational centers in the world. The CPTEC is one of these suppliers of data for TIGGE program. Transfer tests of massive amounts of data for the NCAR, the UNIDATA and the ECMWF, had been done, with the conclusion that the present bandwidth of the center is enough for the TIGGE data delivery. Other needed tasks are the conversion of the ensembles products to the GRIB2 format, and modifications in the output variables from CPTEC emsemble model to meet the TIGGE requirements.

TRANSFER TESTS TO UNIDATA AND ECMWF - Files with fixed sizes (initially 1MB, 10MB and 30MB) had been inserted into CPTEC´s LDM (machine mopora.cptec.inpe.br) for transmission tests to a server in the UNIDATA (yakov.unidata.ucar.edu machine). We increased the rate of ingesting to find the volume and speed transfer limits. Initially a 250MB/Hour rate was used and the data had been transferred to the UNIDATA without data loss and low latencies (maximum of 1 minute). For a rate of 1000MB/hour the latency increased to more than 3600 seconds, with data loss. These results were bad for the TIGGE requirements.
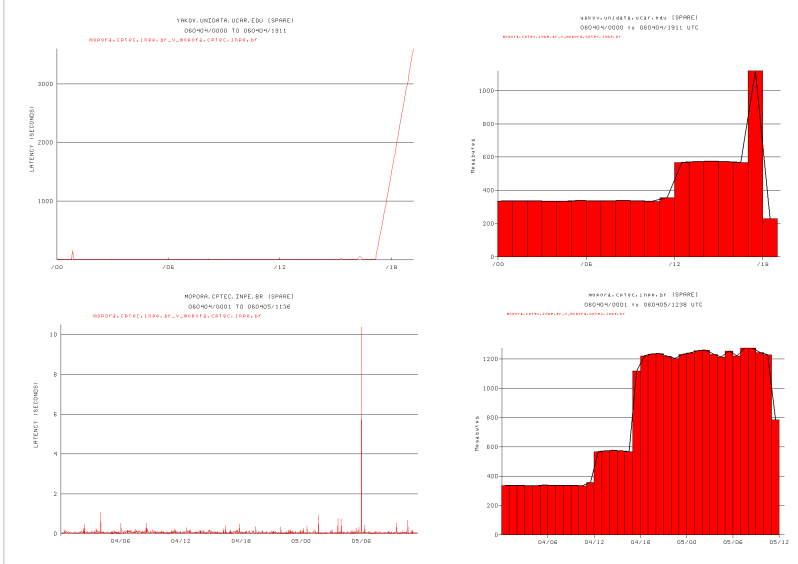
However, in January, 07th 2006 a fact showed that the latencies observed in the large volume data transfers were created by some politics of "packet shaping", also called "QoS" (Quality of Service). In this day the QoS service was off and all the transfers between the CPTEC and the UNIDATA worked with no problems and low latencies. In the morning of January, 09th, a Monday, the packet-shaping filter were turned on again and the high latencies and data loss came back. The participation of the CPTEC/INPE in the TIGGE project demands the delivery of up 3 GB per hour, the limitation caused for "packet shaping" in the routers was making impracticable the supply of data for the TIGGE, therefore it did not allow transfers with more than 800MB each hour.
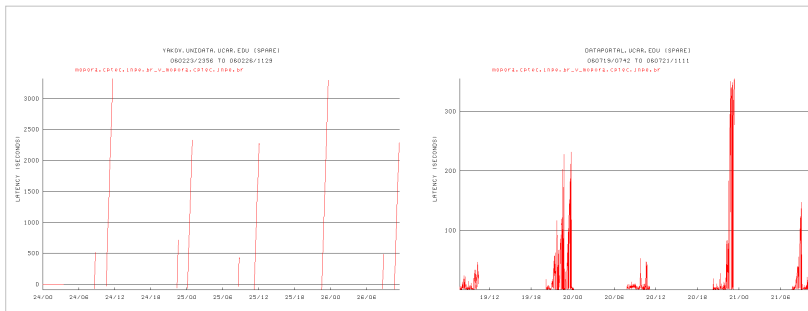
After many tests and experiments, we found a form to establish multiple connections with the LDM, passing through the QoS filters. This solution had been implemented in July, 10th 2006 successfully, as can be seen in the statistics for data transfers from CPTEC to the ECMWF. We got a rate of 2.5 GB/hour with low latencies and no data loss.