# Hyperparameter optimization studies of an environmental use-case with InterTwin

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**Digital Twin**: Virtual representation of a physical system

# InterTwin Project

**-Co-designing and prototyping an interdisciplinary Digital Twin Engine.**

**-Aims to provide a versatile platform that can be used for various scientific applications, such as climate modeling and particle physics simulations.**

**-Crucial in handling data-intensive and computationally demanding tasks, making it a key tool for researchers dealing with large-scale simulations and predictions.**

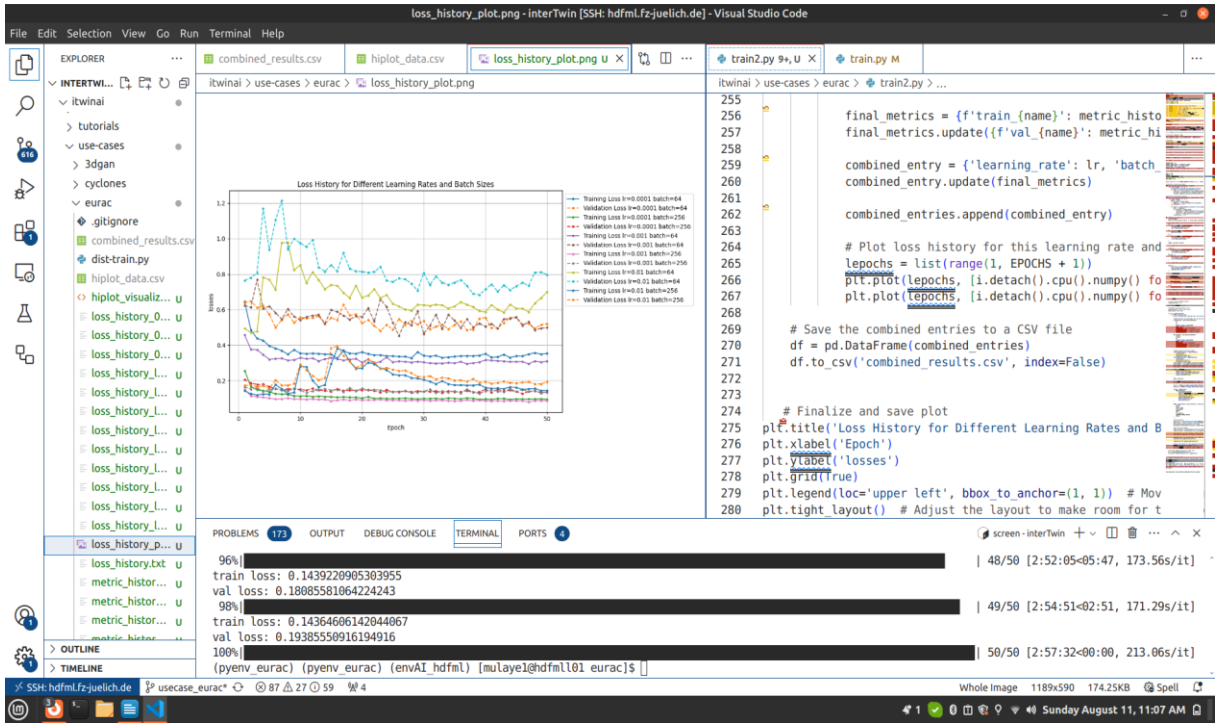
# Use Case

**interTwin Use Case A Digital Twin for Drought Early Warning in the Alps**

EURAC Trento in the context of InterTwin

# Hyperparameter optimization

- Involves fine-tuning the parameters of a model to achieve the best performance
- can lead to more accurate and reliable models, which are essential for making informed decisions.



# Results

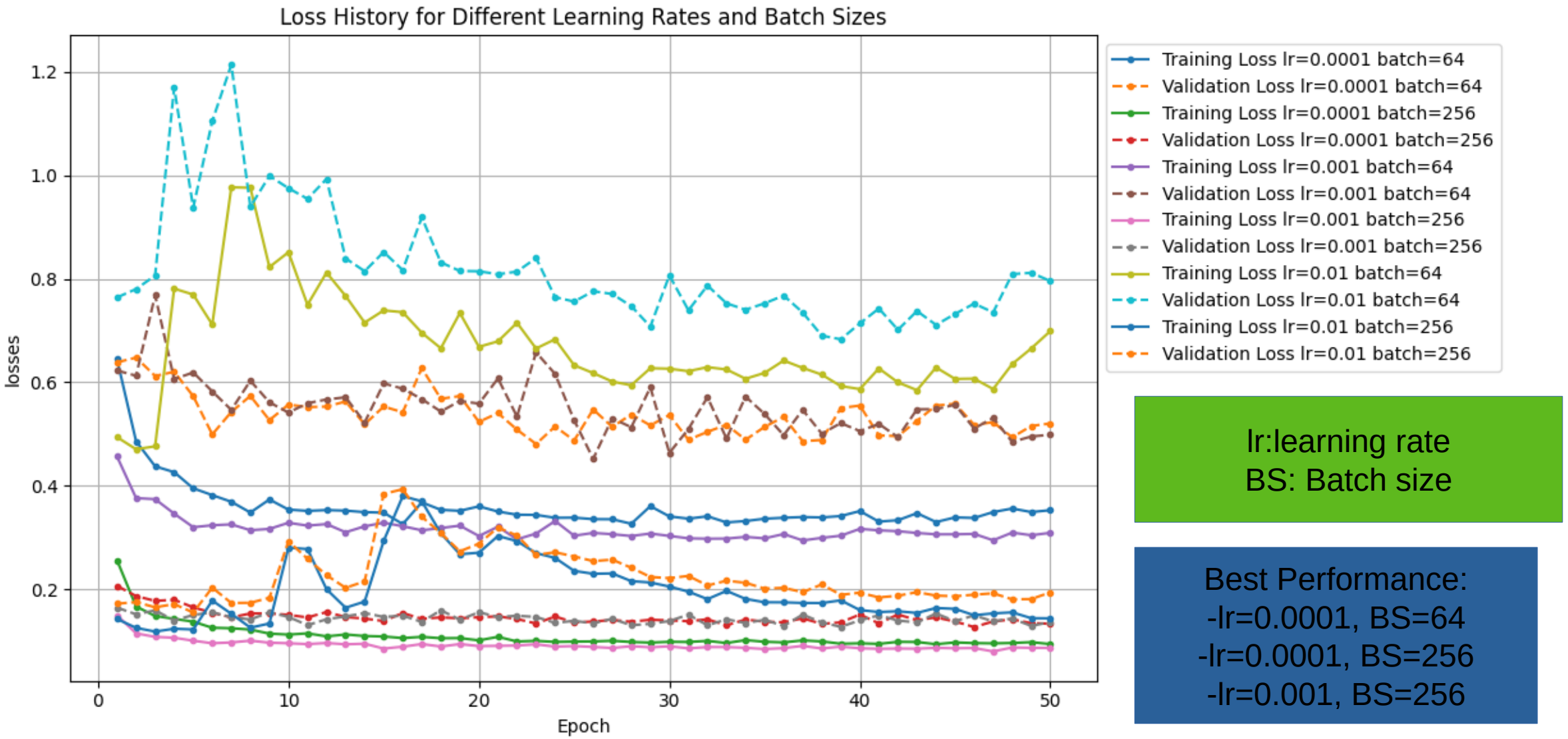
Baseline - Reference point for comparison sake with intertwin integration

**Time Allocation**

**epoch=50**

| | | |
|---|---|---|
| **Lr=1e-4** | **BS=64**<br>**8:12min/ep** | **BS=256**<br>**4:02min/ep** |
| **Lr=1e-3** | **BS=64**<br>**4:24min/ep** | **BS=256**<br>**2:08min/ep** |
| **Lr=1e-2** | **BS=64**<br>**18:53min/ep** | **BS=256**<br>**2:81min/ep** |

Grid search for the lr and batch size and timed the rate at which each epoch was completed



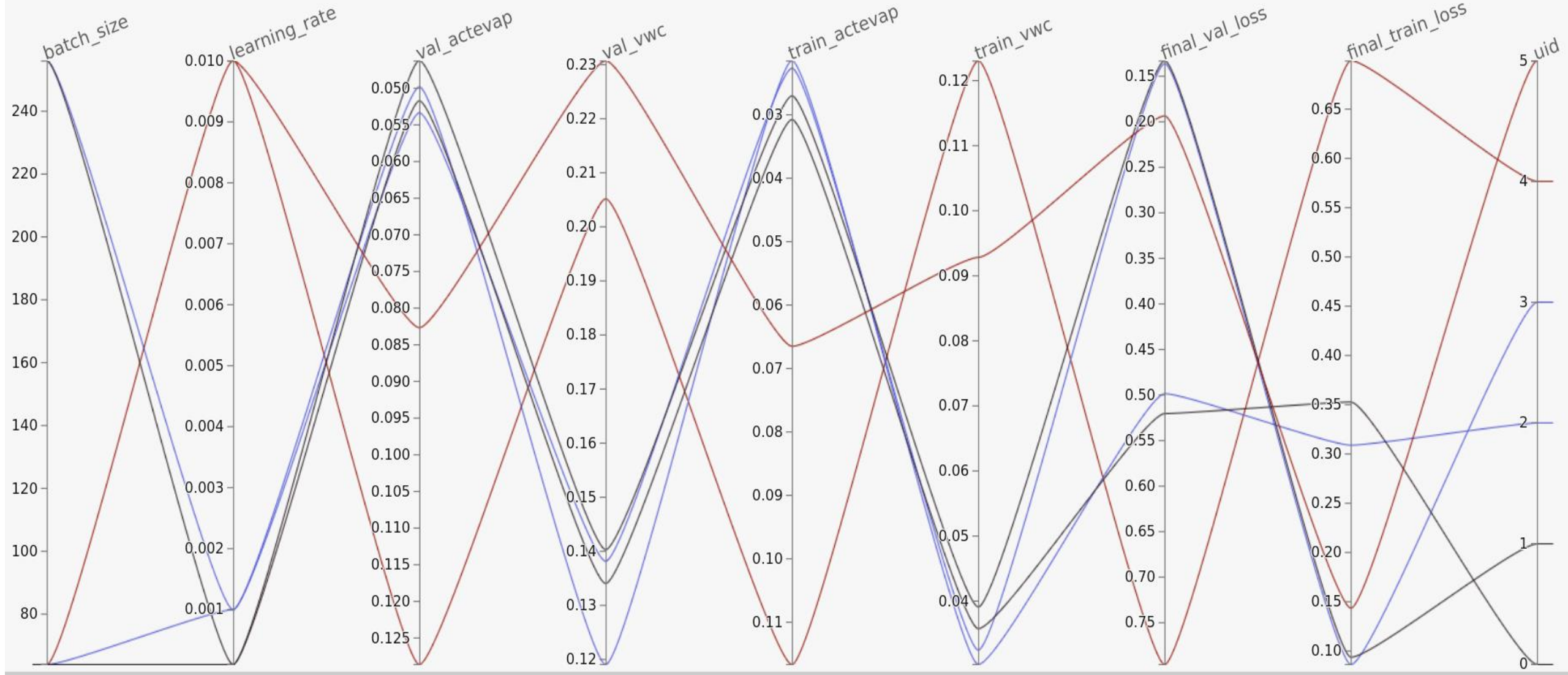

lr:learning rate
BS: Batch size

Best Performance:
-lr=0.0001, BS=64
-lr=0.0001, BS=256
-lr=0.001, BS=256

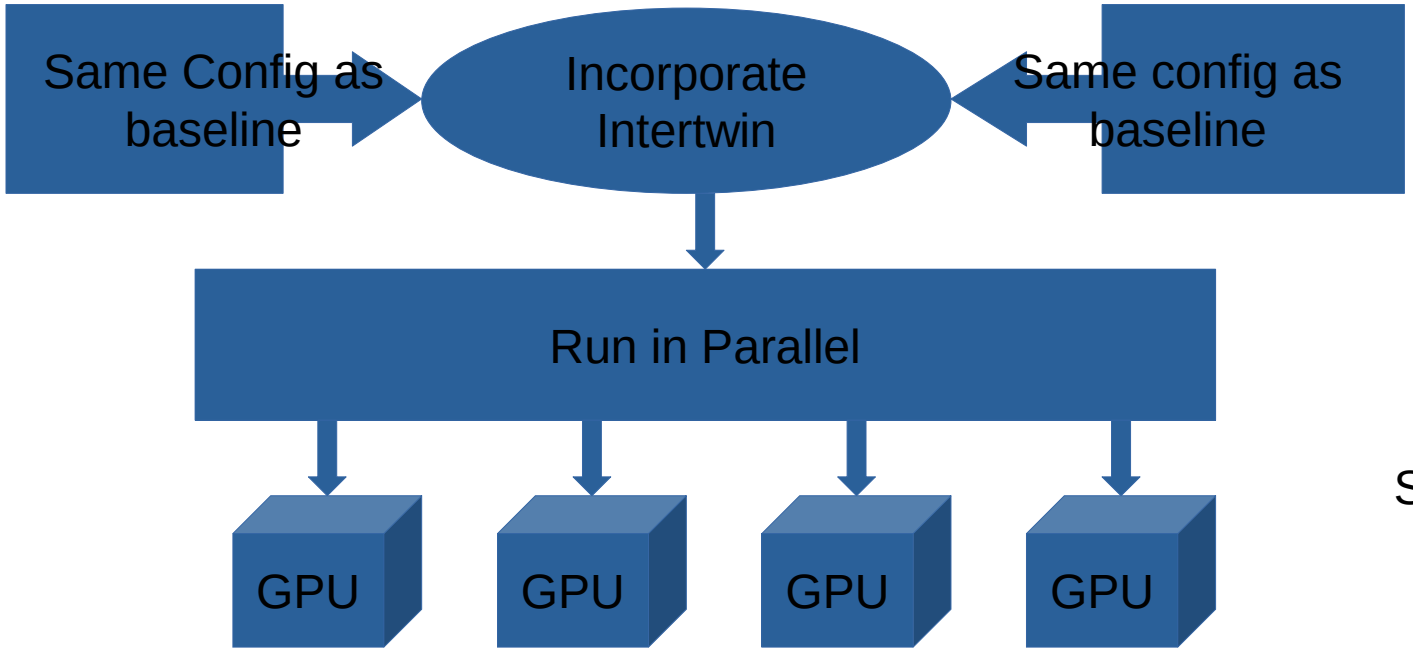
Loaded: combined_results2.csv
Click to load another CSV file, or drop it here

Restore | Keep | Exclude | Export | Help | Selected: 6/6

Plotting tool to visualize a more detailed outlook of the the relationships among parameters used in the model



# Next steps




Simultaneously synchronized

**Take note of the differences in model perfomance for the baseline model and when intertwin is incorporated.**

# Thank you!

merci

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