# Kafka Producer Tuning & Comparison

ASSIGNMENT FRAMEWORK: Kafka Producer Tuning & Comparison  
  
A. Side-by-side differences (cheat sheet)  
| Aspect | kafka-python | confluent-kafka |  
|---|---|---|  
| Send API | producer.send(topic, value) returns a future (optional .get()) | producer.produce(topic, value, on\_delivery=cb) |  
| IO / callbacks | No polling needed | Must call producer.poll() regularly |  
| Backpressure | Raises KafkaTimeoutError/blocks | Raises BufferError when queue is full |  
| Idempotent produce | Limited | enable.idempotence=true |  
| Throughput | Python-only | librdkafka C-core |  
| Compression | gzip, snappy | gzip, snappy, lz4, zstd |  
| Common tunables | linger\_ms, batch\_size | linger.ms, batch.size, compression.type, acks |  
| Delivery status | Future result / exceptions | on\_delivery(err,msg) callback |  
  
B. Baseline configs (start here)  
[... trimmed for brevity, full table in original answer ...]  
  
C. Tuning knobs to explore  
- Partitions  
- linger  
- batch size  
- compression  
- acks  
- idempotence  
- message size  
- producer count  
- keying  
  
D. What to measure  
- Producer-side metrics from Prometheus  
- Broker metrics via JMX exporter  
- Consumer lag (optional)  
  
E. Grafana panels  
- Per-producer rate  
- Topic aggregate rate  
- Errors  
- Broker perspective  
  
F. Experiment design  
- Fix the environment  
- Choose a small matrix of configs  
- Warm up and measure  
- Record numbers and plot  
  
G. Run commands  
[examples from original answer]  
  
H. Reporting template  
Environment, topic config, workload, tuning, producers, results, conclusion  
  
I. Suggested “best settings”  
- confluent-kafka: linger.ms=10–20, batch.size=131072–262144, compression=zstd, acks=1 or all  
- kafka-python: similar but expect lower peak throughput  
  
J. Common pitfalls  
- One partition  
- Forgetting poll()  
- Too-high linger  
- acks=all on single broker

## Grafana Dashboard JSON

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 "annotations": {  
 "list": []  
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 "editable": true,  
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