| Category | Feature | Description |
| --- | --- | --- |
| Scalability and Performance | Support running multiple ADD INDEX statements in parallel | This feature allows for concurrent jobs to add multiple indexes for a single table. Previously, it would take the time of X plus the time of Y to execute two ADD INDEX statements simultaneously (X and Y). With this feature, adding two indexes X and Y in one SQL can be concurrently executed, and the total execution time of DDL is significantly reduced. Especially in scenarios with wide tables, internal test data shows that performance can be improved by up to 94%. |
| Reliability and Availability | Optimize [Global Sort](https://docs.pingcap.com/tidb/v7.5/tidb-global-sort) (experimental, introduced in v7.4.0) | TiDB v7.2.0 introduced the [distributed execution framework](https://docs.pingcap.com/tidb/v7.5/tidb-distributed-execution-framework). For tasks that take advantage of this framework, v7.4 introduces global sorting to eliminate the unnecessary I/O, CPU, and memory spikes caused by temporarily out-of-order data during data re-organization tasks. The global sorting takes advantage of external shared object storage (Amazon S3 in this first iteration) to store intermediary files during the job, adding flexibility and cost savings. Operations like ADD INDEX and IMPORT INTO will be faster, more resilient, more stable, more flexible, and cost less to run. |
| [Resource control for background tasks](https://docs.pingcap.com/tidb/v7.5/tidb-resource-control#manage-background-tasks) (experimental, introduced in v7.4.0) | In v7.1.0, the [Resource Control](https://docs.pingcap.com/tidb/v7.5/tidb-resource-control) feature was introduced to mitigate resource and storage access interference between workloads. TiDB v7.4.0 applied this control to the priority of background tasks as well. In v7.4.0, Resource Control now identifies and manages the priority of background task execution, such as auto-analyze, Backup & Restore, bulk load with TiDB Lightning, and online DDL. In future releases, this control will eventually apply to all background tasks. |
| Resource control for [managing runaway queries](https://docs.pingcap.com/tidb/v7.5/tidb-resource-control#manage-queries-that-consume-more-resources-than-expected-runaway-queries) (experimental, introduced in v7.2.0) | [Resource Control](https://docs.pingcap.com/tidb/v7.5/tidb-resource-control) is a framework for resource-isolating workloads by Resource Groups, but it makes no calls on how individual queries affect work inside of each group. TiDB v7.2.0 introduces "runaway queries control" to let you control how TiDB identifies and treats these queries per Resource Group. Depending on needs, long running queries might be terminated or throttled, and the queries can be identified by exact SQL text, SQL digests or their plan digests, for better generalization. In v7.3.0, TiDB enables you to proactively watch for known bad queries, similar to a SQL blocklist at the database level. |
| SQL | MySQL 8.0 compatibility (introduced in v7.4.0) | In MySQL 8.0, the default character set is utf8mb4, and the default collation of utf8mb4 is utf8mb4\_0900\_ai\_ci. TiDB v7.4.0 adding support for this enhances compatibility with MySQL 8.0 so that migrations and replications from MySQL 8.0 databases with the default collation are now much smoother. |
| DB Operations and Observability | TiDB Lightning's physical import mode integrated into TiDB with [IMPORT INTO](https://docs.pingcap.com/tidb/v7.5/sql-statement-import-into) (GA) | Before v7.2.0, to import data based on the file system, you needed to install [TiDB Lightning](https://docs.pingcap.com/tidb/v7.5/tidb-lightning-overview) and used its physical import mode. Now, the same capability is integrated into the IMPORT INTO statement so you can use this statement to quickly import data without installing any additional tool. This statement also supports the [distributed execution framework](https://docs.pingcap.com/tidb/v7.5/tidb-distributed-execution-framework) for parallel import, which improves import efficiency during large-scale imports. |
| Specify [the respective TiDB nodes](https://docs.pingcap.com/tidb/v7.5/system-variables#tidb_service_scope-new-in-v740) to execute the ADD INDEX and IMPORT INTO SQL statements (GA) | You have the flexibility to specify whether to execute ADD INDEX or IMPORT INTO SQL statements on some of the existing TiDB nodes or newly added TiDB nodes. This approach enables resource isolation from the rest of the TiDB nodes, preventing any impact on business operations while ensuring optimal performance for executing the preceding SQL statements. In v7.5.0, this feature becomes generally available (GA). |
| DDL supports [pause and resume operations](https://docs.pingcap.com/tidb/v7.5/ddl-introduction#ddl-related-commands) (GA) | Adding indexes can be big resource consumers and can affect online traffic. Even when throttled in a Resource Group or isolated to labeled nodes, there may still be a need to suspend these jobs in emergencies. As of v7.2.0, TiDB now natively supports suspending any number of these background jobs at once, freeing up needed resources while avoiding having to cancel and restart the jobs. |
| TiDB Dashboard supports heap profiling for TiKV | Previously, addressing TiKV OOM or high memory usage issues typically required manual execution of jeprof to generate a heap profile in the instance environment. Starting from v7.5.0, TiKV enables remote processing of heap profiles. You can now directly access the flame graph and call graph of heap profile. This feature provides the same simple and easy-to-use experience as Go heap profiling. |

| Category | Feature | Description |
| --- | --- | --- |
| Reliability and Availability | Improve the performance and stability of IMPORT INTO and ADD INDEX operations via [global sort](https://docs.pingcap.com/tidb/v7.4/tidb-global-sort) (experimental) | Before v7.4.0, tasks such as ADD INDEX or IMPORT INTO using the [distributed execution framework](https://docs.pingcap.com/tidb/v7.4/tidb-distributed-execution-framework) meant localized and partial sorting, which ultimately led to TiKV doing a lot of extra work to make up for the partial sorting. These jobs also required TiDB nodes to allocate local disk space for sorting, before loading to TiKV. With the introduction of the Global Sorting feature in v7.4.0, data is temporarily stored in external shared storage (S3 in this version) for global sorting before being loaded into TiKV. This eliminates the need for TiKV to consume extra resources and significantly improves the performance and stability of operations like ADD INDEX and IMPORT INTO. |
| [Resource control](https://docs.pingcap.com/tidb/v7.4/tidb-resource-control#manage-background-tasks) for background tasks (experimental) | In v7.1.0, the [Resource Control](https://docs.pingcap.com/tidb/v7.4/tidb-resource-control#use-resource-control-to-achieve-resource-isolation) feature was introduced to mitigate resource and storage access interference between workloads. TiDB v7.4.0 applies this control to background tasks as well. In v7.4.0, Resource Control now identifies and manages the resources produced by background tasks, such as auto-analyze, Backup & Restore, bulk load with TiDB Lightning, and online DDL. This will eventually apply to all background tasks. |
| TiFlash supports [storage-computing separation and S3](https://docs.pingcap.com/tidb/v7.4/tiflash-disaggregated-and-s3) (GA) | TiFlash disaggregated storage and compute architecture and S3 shared storage become generally available:   * Disaggregates TiFlash's compute and storage, which is a milestone for elastic HTAP resource utilization. * Supports using S3-based storage engine, which can provide shared storage at a lower cost. |
| SQL | TiDB supports [partition type management](https://docs.pingcap.com/tidb/v7.4/partitioned-table#convert-a-partitioned-table-to-a-non-partitioned-table) | Before v7.4.0, Range/List partitioned tables support partition management operations such as TRUNCATE, EXCHANGE, ADD, DROP, and REORGANIZE, and Hash/Key partitioned tables support partition management operations such as ADD and COALESCE.  Now TiDB also supports the following partition type management operations:   * Convert partitioned tables to non-partitioned tables * Partition existing non-partitioned tables * Modify partition types for existing tables |
| MySQL 8.0 compatibility: support [collation utf8mb4\_0900\_ai\_ci](https://docs.pingcap.com/tidb/v7.4/character-set-and-collation#character-sets-and-collations-supported-by-tidb) | One notable change in MySQL 8.0 is that the default character set is utf8mb4, and the default collation of utf8mb4 is utf8mb4\_0900\_ai\_ci. TiDB v7.4.0 adding support for this enhances compatibility with MySQL 8.0 so that migrations and replications from MySQL 8.0 databases with the default collation are now much smoother. |
| DB Operations and Observability | Specify [the respective TiDB nodes](https://docs.pingcap.com/tidb/v7.4/system-variables#tidb_service_scope-new-in-v740) to execute the IMPORT INTO and ADD INDEX SQL statements (experimental) | You have the flexibility to specify whether to execute IMPORT INTO or ADD INDEX SQL statements on some of the existing TiDB nodes or newly added TiDB nodes. This approach enables resource isolation from the rest of the TiDB nodes, preventing any impact on business operations while ensuring optimal performance for executing the preceding SQL statements. |

| Category | Feature | Description |
| --- | --- | --- |
| Scalability and Performance | TiDB Lightning supports [Partitioned Raft KV](https://docs.pingcap.com/tidb/v7.3/partitioned-raft-kv) (experimental) | TiDB Lightning now supports the new Partitioned Raft KV architecture, as part of the near-term GA of the architecture. |
| Reliability and Availability | [Add automatic conflict detection and resolution on data imports](https://docs.pingcap.com/tidb/v7.3/tidb-lightning-physical-import-mode-usage#conflict-detection) | The TiDB Lightning Physical Import Mode supports a new version of conflict detection, which implements the semantics of replacing (replace) or ignoring (ignore) conflict data when encountering conflicts. It automatically handles conflict data for you while improving the performance of conflict resolution. |
| [Manual management of runaway queries](https://docs.pingcap.com/tidb/v7.3/tidb-resource-control#query-watch-parameters) (experimental) | Queries might take longer than you expect. With the new watch list of resource groups, you can now manage queries more effectively and either deprioritize or kill them. Allowing operators to mark target queries by exact SQL text, SQL digest, or plan digest and deal with the queries at a resource group level, this feature gives you much more control over the potential impact of unexpected large queries on a cluster. |
| SQL | [Enhance operator control over query stability by adding more optimizer hints to the query planner](https://docs.pingcap.com/tidb/v7.3/optimizer-hints) | Added hints: NO\_INDEX\_JOIN(), NO\_MERGE\_JOIN(), NO\_INDEX\_MERGE\_JOIN(), NO\_HASH\_JOIN(), NO\_INDEX\_HASH\_JOIN() |
| DB Operations and Observability | [Show the progress of statistics collection tasks](https://docs.pingcap.com/tidb/v7.3/sql-statement-show-analyze-status) | Support viewing the progress of ANALYZE tasks using the SHOW ANALYZE STATUS statement or through the mysql.analyze\_jobs system table. |

| Category | Feature | Description |
| --- | --- | --- |
| Scalability and Performance | Resource groups support [managing runaway queries](https://docs.pingcap.com/tidb/v7.2/tidb-resource-control#manage-queries-that-consume-more-resources-than-expected-runaway-queries) (experimental) | You can now manage query timeout with more granularity, allowing for different behaviors based on query classifications. Queries meeting your specified threshold can be deprioritized or terminated. |
| TiFlash supports the [pipeline execution model](https://docs.pingcap.com/tidb/v7.2/tiflash-pipeline-model) (experimental) | TiFlash supports a pipeline execution model to optimize thread resource control. |
| SQL | Support a new SQL statement, [IMPORT INTO](https://docs.pingcap.com/tidb/v7.2/sql-statement-import-into), for data import (experimental) | To simplify the deployment and maintenance of TiDB Lightning, TiDB introduces a new SQL statement IMPORT INTO, which integrates physical import mode of TiDB Lightning, including remote import from Amazon S3 or Google Cloud Storage (GCS) directly into TiDB. |
| DB Operations and Observability | DDL supports [pause and resume operations](https://docs.pingcap.com/tidb/v7.2/ddl-introduction#ddl-related-commands) (experimental) | This new capability lets you temporarily suspend resource-intensive DDL operations, such as index creation, to conserve resources and minimize the impact on online traffic. You can seamlessly resume these operations when ready, without the need to cancel and restart. This feature enhances resource utilization, improves user experience, and streamlines schema changes. |