at a modest cost in terms of increased CPU utilization. You can adjust the balance between compression level and CPU overhead by modifying the `innodb_compression_level` configuration option.

InnoDB Data Storage and Compression

All user data in InnoDB tables is stored in pages comprising a B-tree index (the clustered index). In some other database systems, this type of index is called an “index-organized table”. Each row in the index node contains the values of the (user-specified or system-generated) primary key and all the other columns of the table.

Secondary indexes in InnoDB tables are also B-trees, containing pairs of values: the index key and a pointer to a row in the clustered index. The pointer is in fact the value of the primary key of the table, which is used to access the clustered index if columns other than the index key and primary key are required. Secondary index records must always fit on a single B-tree page.

The compression of B-tree nodes (of both clustered and secondary indexes) is handled differently from compression of overflow pages used to store long `VARCHAR`, `BLOB`, or `TEXT` columns, as explained in the following sections.

Compression of B-Tree Pages

Because they are frequently updated, B-tree pages require special treatment. It is important to minimize the number of times B-tree nodes are split, as well as to minimize the need to uncompress and recompress their content.

One technique MySQL uses is to maintain some system information in the B-tree node in uncompressed form, thus facilitating certain in-place updates. For example, this allows rows to be delete-marked and deleted without any compression operation.

In addition, MySQL attempts to avoid unnecessary uncompression and recompression of index pages when they are changed. Within each B-tree page, the system keeps an uncompressed “modification log” to record changes made to the page. Updates and inserts of small records may be written to this modification log without requiring the entire page to be completely reconstructed.

When the space for the modification log runs out, InnoDB uncompresses the page, applies the changes and recompresses the page. If recompression fails (a situation known as a compression failure), the B-tree nodes are split and the process is repeated until the update or insert succeeds.

To avoid frequent compression failures in write-intensive workloads, such as for OLTP applications, MySQL sometimes reserves some empty space (padding) in the page, so that the modification log fills up sooner and the page is recompressed while there is still enough room to avoid splitting it. The amount of padding space left in each page varies as the system keeps track of the frequency of page splits. On a busy server doing frequent writes to compressed tables, you can adjust the `innodb_compression_failure_threshold_pct`, and `innodb_compression_pad_pct_max` configuration options to fine-tune this mechanism.

Generally, MySQL requires that each B-tree page in an InnoDB table can accommodate at least two records. For compressed tables, this requirement has been relaxed. Leaf pages of B-tree nodes (whether of the primary key or secondary indexes) only need to accommodate one record, but that record must fit, in uncompressed form, in the per-page modification log. If `innodb_strict_mode` is `ON`, MySQL checks the maximum row size during `CREATE TABLE` or `CREATE INDEX`. If the row does not fit, the following error message is issued: `ERROR HY000: Too big row`.

If you create a table when `innodb_strict_mode` is OFF, and a subsequent `INSERT` or `UPDATE` statement attempts to create an index entry that does not fit in the size of the compressed page, the